# E.02.14 – DCI-4HD2D – D3.2 Final technical report – 00.00.01

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### *Abstract*

The Flight Path 2050 presents Europe's Vision for Aviation for the future. In what refers to air traffic management, this vision includes concrete goals for the punctuality of flights and capacity of the air traffic management system. Additionally, the document adds a concrete goal in what refers to **passenger mobility**, stating that **90% of the passengers should be able to travel door-to-door in Europe within 4 hours**.

Passenger mobility is obviously the ultimate goal of the air transport system, which mission is to transport passengers and freight, not airplanes. However, punctuality is currently mostly measured as aircraft operations performance. Moreover, most air traffic management technology improvements are targeting aircraft punctuality and not passenger punctuality. Passenger punctuality depends

critically on **passenger connectivity**, as a missed connection impacts very negatively in passenger mobility performance.

Increasing the predictability of air transport operations has limits. Not only meteorological conditions can affect the punctuality but also countless operational hazards impact the air traffic management system. **Making the system adaptable to changes in the operational conditions**, capable of re-configuring itself to accommodate to a new scenario seems a better approach than trying to make the system robust, which ultimately could be too expensive or impossible.

Studying how different mechanisms improve the **adaptability of the system** is a complex problem. On one hand, it is a challenge to design a procedure that provides adaptability without impacting other performance metrics of the system. On the other hand, complex mechanisms usually require **dedicated simulation frameworks**, capable of modelling realistically a large number of parameters as well as providing a **performance framework** capable of evaluating in detail (e.g. beyond simple statistical properties) how the system adapts to the new conditions and how those mechanisms target a performance goal.

The **CASSIOPEIA DCI-4HD2D** project extension studied how **changing the trajectory of each aircraft to either minimise fuel consumption or to minimise time to destination** can be used as a adaptability mechanism, to work together with other ATM improvements, to address passenger connectivity.

Understanding how this mechanism, known as **Dynamic Cost Indexing (DCI)**, increases the adaptability of the system, required the analysis, design and implementation of a complex software system as a collection of interacting, autonomous agents.

This document reports on the cases of study selected and the analysis of the outcome of the simulations performed, assessing how DCI contributes to passenger connectivity and, ultimately, to passenger mobility improvement.

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# Document History

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# 1 Introduction

## 1.1 Purpose of the document

This document contains the final technical report for WP-E project DCI-4HD2D "Complex Adaptive Systems for Optimisation of Performance in ATM". This document summarises the project objectives and methodology, defines the scenarios simulated and the metrics analysed, and includes the final results and conclusions of the project.

## 1.2 Intended readership

This report is written for the professional reader with a background on DCI-4HD2D project and assumes an understanding of air transport and ATM. Without detriment to appropriate referencing and delineation, the text is not cluttered with explanations of common acronyms or principles.

## 1.3 Inputs from other projects

This project is the extension of project E.02.14 CASSIOPEIA, and as such, many components will be related. However, for readability purposes, this document will be self-contained.

## 1.4 Glossary of terms

| Term | Definition |
|---|---|
| ABM | Agent Base Modelling |
| A-CDM | Airport Collaborative Decision Making |
| AIBT | Actual In-Block Time |
| ALT | Actual Landing Time |
| AMAN | Arrival Manager |
| ANSP | Air Navigation Service Provider |
| AO | Aircraft Operator |
| AOC | Aircraft Operator Centre |
| AOBT | Actual Off-Block Time |
| ARCT | Actual Reaching Cruise Time |
| ATFM | Air Traffic Flow Management |
| ATM | Air Traffic Management |
| ATMS | Air Traffic Management System |
| ATOT | Actual Take-Off Time |
| APTI | Actual Passing Time over IAF |
| BADA | Base of Aircraft Data |
| CASS | CASSIOPEIA |
| CASSIOPEIA | Complex Adaptive Systems for the Optimisation of ATM |
| CDM | Collaborative Decision Making |
| CFMU | Central Flow Management Unit |
| CHT | Charter Carrier |
| CI | Cost Index |
| CO | Carbon Monoxide |
| CODA | Central Office for Delay Analysis |
| CS | Case Study |
| DCI | Dynamic Cost Indexing |
| DD | Departing Delay |
| DMAN | Departure Manager |
| E-AMAN | Extended Arrival Manager |
| EATM | European Air Traffic Management |
| ECAC | European Civil Aviation Conference |

| Term | Definition |
|---|---|
| EPTI | Estimated Passing Time over IAF |
| ERCT | Estimated Reaching Cruise Time |
| FL | Flight Level |
| FSC | Full Service Carrier |
| GCD | Great Circle Distance |
| IAF | Initial Approach Fix |
| IATA | International Air Transport Association |
| IF | Inbound Flight |
| LCC | Low Cost Carrier |
| MTOW | Maximum Take-Off Weight |
| MCT | Minimum Connecting Time |
| MTT | Minimum Turnaround Time |
| NM | Nautical Miles |
| OF | Outbound Flight |
| PRISME | Pan-European Repository of Information Supporting the Management of EATM |
| REG | Regional Carrier |
| SESAR | Single European Sky ATM Research Programme |
| SIBT | Scheduled In-Block Time |
| SOBT | Scheduled Off-Block Time |
| SWIM | System Wide Information Management |
| TAS | True Air Speed |
| TMA | Terminal Manoeuvre Area |
| TOC | Top Of Climb |
| TOD | Top Of Descent |
| UDPP | User-Driven-Prioritisation Process |
| US | United States of America |
| WFP | Wait-For-Passenger |
| VMO | Maximum Operating Speed |
| Vmax | Maximum Operating Speed |
| WP | Work Package |

## 1.5 Structure of the Document

The document is structured in 10 sections as defined here:

- Section 1: Introduction.
- Section 2: Problem description shows the description of the project tackled in DCI-4HD2D project.
- Section 3: Cases of study presents the different cases of study considered in the project.
- Section 4: Datasets, indicates the different data sources used as input for the project and the different computations required to define these inputs. Traffic and passengers itineraries, the different uncertainties modelled and the initial delays considered and modelled in the system are presented.
- Section 5: Input data analysis, presents the results that can be obtained by analysing the input data of the model such as the demand, buffers, potential impact of ground improvements or maximum potential delay that can be recovered.
- Section 6: Metrics, describes the different metrics computed during the model execution.
- Section 7: Results, shows the results found in the project after the execution and analysis of the different scenarios.
- Section 8: Further work, compiles model enhancement and future lines of research that can be extracted from DCI-4HD2D project.

- Section 9: Conclusions, summarises the findings of the deliverable and the project.
- Section 10: References

## 1.6 Methodology

Reaching final conclusions requires analysis of the data obtained by the simulations. The data obtained in simulations can be very large and special techniques are needed to reach the conclusions, as there is no single indicator that could validate or invalidate certain hypothesis.

We are using a two-step approach to reach the final conclusions. The first step is *a priori* analysis: a high level hypothesis to be tested on data. Hypotheses have been divided into three categories: Delay, Costs and Efficiency. Hypotheses consist on a reasonable or expected result, based on the teams own expertise or common knowledge. Once the hypotheses have been stated, a set of test are defined in the second phase. Tests are a combination of output metrics and scenarios. Using the information on the test the hypothesis can be quantified and then accepted, rejected or reformulated.

Accepted hypothesis produce *a priori* results, e.g. statements thought to be true before the analysis that are now supported by evidence. Rejected hypothesis produce *a posteriori* results, e.g. new discoveries that contradicts common beliefs. In many cases rejected hypothesis are reformulated to better represent the findings on data during analysis.

## 1.7 Acknowledgments

We are most grateful to Zurich Airport (Flughafen Zürich AG) for the generous provision of data used during the course of this research.

# 2 Problem description

Cost Index (CI) in a flight management system (FMS) represents the relationship between cost of time and cost of fuel used for a given flight. A low cost index, therefore, instructs the aircraft to follow a trajectory that minimises fuel consumption; while higher values of cost index, conversely, reduce time even at expenses of using more fuel. The concept of Dynamic Cost Indexing (DCI) entails modifying the value of this parameter during the different flight phases considering the situation (Cook et al., 2009). This dynamic optimisation of airspeed might help on the challenge of achieving a vision of 90% of passengers travelling in less than 4 hours door-to-door within any two points in Europe (European Commission, 2011).

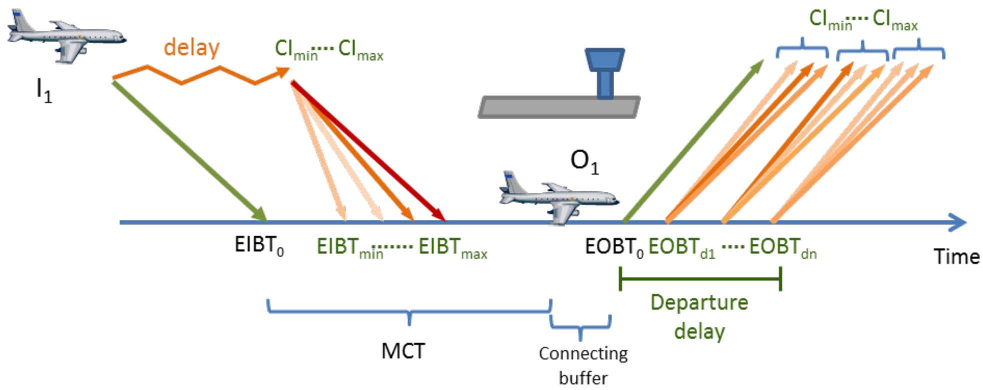



**Figure 1- Diagram of DCI usage (SESAR, 2014)**

As presented in Figure 1 when an inbound flight faces delay there are a set of options available in terms of CI to be selected to recover different amounts of delays. Each option will involve different costs in terms of fuel and delay. One of the most important parameters to consider is passenger connectivity with other flights. Therefore, for each inbound flight that is delayed, the best strategies for the outbound connecting flights are analysed. The most economical option might involve delaying one or several outbound flights to wait for connecting passengers (wait-for-passenger rule) and then speed them up on their turn. These relationships are considered in the project.

Moreover, flights dynamically modifying their trajectory based on uncertainty and delay might impact ANSPs' capacities and traffic predictions. This can lead in some cases to a saturation at the hub airport leading into a situation where a flight is speeding up to recover part of the delay just to end up in a waiting queue for landing. For this reason, an advanced extended arrival manager (E-AMAN) is also modelled. This arrival manager ensures that the flights will not overpass the airport capacity while *negotiating* the assignment of arrival slots. A similar principle is considered for the departure manager (DMAN).

This work focuses on gate-to-gate processes and how the extended use of Dynamic Cost Indexing can be helpful in absorbing delay while maintaining predictability. The study encompasses inbound and outbound flights at a large European hub; as well as a reduction of turnaround and passenger connection processes at the airport, exploring passenger connectivity metrics.

## 2.1 Problem complexity

As described in (SESAR, 2014), for each inbound flight with connecting passengers there might be a set of outbound flights to which those passengers connect, and for each outbound flight there might be a set of inbound flights feeding the outbound flight with connecting passengers. This means that deciding for each flight the optimal strategy in terms of delay recovery and wait-for-passenger rules (WFP) is a very complex task from a computational point of view. Moreover, the system has uncertainties and limits on the resources available, e.g., landing slots. For this reason, instead of an analytical optimal solution, modelling with an agent-based architecture is preferred.

## 2.2 ABM

Agent based modelling (ABM) allows us to describe the behaviour of the different agents involved on the operations at the hub in a separated and detailed manner. When running the simulations with the different agents and their individual behaviour, a global emergent behaviour of the system is obtained. The detail of the different agents modelled is explained in (SESAR, 2015). The main relationships and interactions are summarised in this section.

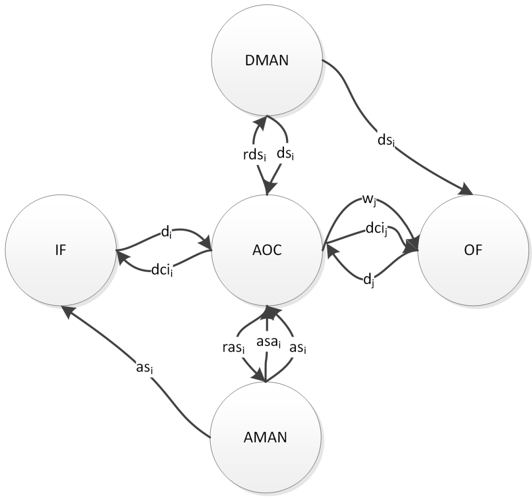



**Figure 2- Diagram of agents and their interaction.**

Figure 2 present the different agents that are modelled and their interactions. The different roles played by the agents are defined as follows:

- Aircraft Operator Centre (AOC): the AOC centralises the decisions taken by the airlines during the simulation.
- Inbound flight (IF): the inbound flights will implement the DCI strategy defined by the AOC.
- Outbound flight (OF): the outbound flights will implement the DCI and the WFP strategy defined by the AOC.
- AMAN: the AMAN will manage the arrival traffic to meet the airport arrival capacity by assigning flights to slots.
- DMAN: the DMAN will manage the departure traffic to meet the airport departure capacity by assigning flights to slots.

The interactions defined among the agents are as follow:

- Each inbound flight will update their EIBT at different stages during the flight (reaching TOC and when entering the action radius of the AMAN).
  - At the TOC, the flight will communicate its delay to the AOC ($d_i$). The AOC will assess the situation and compute the DCI that the inbound flight should select ($dci_i$). For each outbound flight that has connecting passengers with the delayed inbound flight, the AOC will assess if a wait-for-passenger should be implemented ($w_j$) and, depending on the strategy selected, what would the optimal DCI for that outbound flight ($dci_j$).
  - When the flight enters in the action region of the AMAN, there is a request of arrival slots available to the AMAN ($asa_i$), the AOC will prioritise the arrival slots and send this prioritisation to the AMAN ($ras_i$). When the AMAN solves the slot assignment, a slot is given to the flight ($as_i$). At this time, the flight will have an arrival slot assigned and therefore, the

AOC can update the wait-for-passengers and the DCI for the outbound flights relevant to that inbound flight.

- For each outbound flight the wait-for-passenger and DCI strategy will be updated as follows:
  - Each time an inbound flight with connecting passenger updates their EIBT, a recalculation of the wait-for-passenger and DCI is carried out by the AOC, this might lead to new $w_j$ and $dci_j$ values.
  - The outbound flight might be delayed for reasons independent of the WFP strategy ($d_j$). Each time there is an update on the delay of the outbound flight, the AOC is notified so it can take it into consideration when inbound flights are delayed.
  - When the outbound flight is ready for departure, a request of departure slot is submitted to the DMAN ($rds_j$), which will provide a departure slot ($ds_j$).
  - Finally, when the outbound flight reaches the TOC, a final update on the DCI is carried out by the AOC.

## 2.3 Calculation of costs

The model calculates costs at different instants (for DCI calculation):

For inbound flights:

- At ARCT: When reaching cruise level: At this time, the airline will calculate the DCI taking into account at gate delay and taxi delay.
- At APTI - 60 min: When contacting AMAN for approach: At this time the aircraft will contact the AMAN and receive the possible slots for approach. The airline will calculate DCI for the different slots and send the AMAN a list slot priority list.

For outbound flights:

- At EOBT: When the aircraft is supposed to close its doors, it calculates if it should wait for passengers and assesses the different airspeeds.
- At ARCT: When reaching cruise level: At this time it takes into account at gate delay and taxi delay.

At the end of the simulation, these costs are aggregated to obtain the final scenario results. These processes are summarised in Table 1 where a description of which costs are calculated and considered when DCI is re-assessed is shown. Figure 3 shows the different delays of a flight.

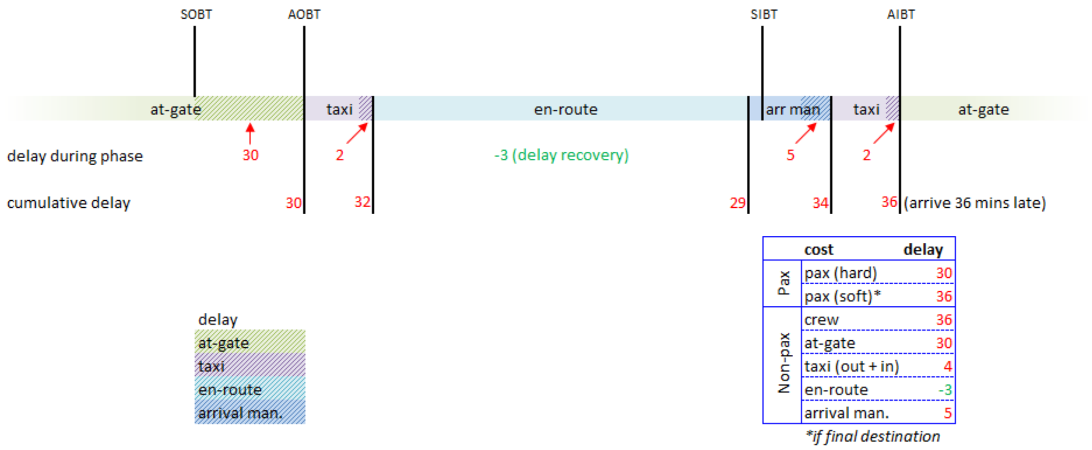



Figure 3- Example of flight phases and non-passenger costs computations

| | | Flight phase | ARCT inbound | AMAN | EOBT outbound | ARCT outbound | Simulation end |
|---|---|---|---|---|---|---|---|
| Outbound flight | Pax | Soft | ✓ | ✓ | ✓ | ✓ | Final |
| | | Hard | ✓ | ✓ | Final | Final | Final |
| | Non-pax | Fuel | ✓ | ✓ | ✓ | ✓ | Final |
| | | Crew | ✓ | ✓ | ✓ | ✓ | Final |
| | | Taxi in (maint) | × | × | × | × | Final |
| | | Arrival (maint) | × | × | × | × | × |
| | | En-route (maint) | ✓ | ✓ | ✓ | ✓ | Final |
| | | Taxi out (maint) | × | × | × | Final | Final |
| | | At gate (maint) | ✓ | ✓ | ✓ | Final | Final |
| | | Wait for pax | ✓ | ✓ | Final | | |
| Inbound flight | Pax | Soft | ✓ | ✓ | | | Final |
| | | Hard | ✓ | ✓ | | | Final |
| | Non-pax | Fuel | ✓ | ✓ | | | Final |
| | | Crew | ✓ | ✓ | | | Final |
| | | Taxi in (maint) | × | × | | | Final |
| | | Arrival (maint) | × | ✓ | | | Final |
| | | En-route (maint) | ✓ | ✓ | | | Final |
| | | Taxi out (maint) | Final | Final | | | Final |
| | | At gate (maint) | Final | Final | | | Final |

✓ Re-computed and assessed
× Not considered
Final fixed

Table 1 – Cost computations at different phases for inbound and outbound flights

### 2.3.1 Fuel costs

Fuel consumption is estimated considering BADA 4.0 (EUROCONTOL, 2015). The fuel consumption is approximated with a 4th degree polynomial.

For each aircraft the following information is considered:

- Type: aircraft model.
- FL: Flight level assumed to be used by the aircraft.
- $W_{ref}$: Reference weight of the aircraft.
- $M_{ref}$: Mach of reference for the aircraft type
- $K_{mminRef}$: Mach of reference in km/min

The flight envelope of each aircraft type is computed in order to ensure that the selected speeds are within the aircraft performance limits (avoiding selecting speeds faster than the maximum allowed by the thrust nor too slow causing the aircraft to stall). These are the set of airspeeds for each aircraft:

- $M_{min}$: minimum possible Mach.
- $M_{max}$: maximum possible Mach.
- $S_{min}$: minimum possible speed in km/min.
- $S_{max}$: maximum possible speed in km/min.

The above mentioned aircraft envelope has been computed assuming a load factor of 1.3 g. This is in accordance to the regulation and ensures manoeuvrability when flying at low speeds (European Aviation Safety Agency, 2011).

The FL and weight considered for each flight is based on the flight plan distance as defined in SESAR (2014). An analysis of FL selected as a function of the flight plan distance has been performed and the optimal weight estimated based on that data. For some long-haul flights, the no explicit implementation of cruise steps might lead to over estimation of weight and/or altitude, for this reason for some flights the weight and flight level have been modified.

For the aircraft types for which BADA 4.0 performances were not available (35% of the total traffic), BADA 3 performances have been considered. Note that part of this traffic corresponds to non-passenger flights (e.g. freight), which are excluded from the DCI optimisation.

### 2.3.2 Delay non-passengers costs

**a) Delay maintenance costs**

Maintenance cost are estimated following a normal probability distribution of parameters ~N(base, [high-low]/4), where:

Low, base, high= $\sqrt{MTOW} \cdot m + c$,

where:

(i) at-gate maintenance costs

| All aircraft | Low | Base | High |
|---|---|---|---|
| m | 0.04 | 0.05 | 0.06 |
| c | -0.14 | 0.04 | 0.12 |

Table 2 – At gate maintenance costs distribution parameters

(ii) taxi maintenance costs (including baseline fuel burn)

| All aircraft | Low | Base | High |
|---|---|---|---|
| m | 1.31 | 1.88 | 2.46 |

| All aircraft | Low | Base | High |
|---|---|---|---|
| c | -3.61 | -4.12 | -5.24 |

Table 3 – Taxi maintenance costs distribution parameters

(iii) en-route maintenance costs

| All aircraft | Low | Base | High |
|---|---|---|---|
| m | 0.32 | 0.37 | 0.43 |
| c | -0.86 | 0.35 | 0.87 |

Table 4 – En-route maintenance costs distribution parameters

(iv) arrival management maintenance costs

| All aircraft | Low | Base | High |
|---|---|---|---|
| m | 0.32 | 0.37 | 0.43 |
| c | -0.86 | 0.35 | 0.87 |

Table 5 – Arrival management maintenance costs distribution parameters

(v) crew costs on arrival

| All aircraft | Low | Base | High |
|---|---|---|---|
| m | 0.00 | 0.72 | 2.24 |
| c | 0.00 | 2.29 | -0.42 |

Table 6 – Crew costs on arrival distribution parameters

### 2.3.3 Delay passengers costs

Passenger costs are classified in the following manner:

- Inbound flights:
  - Connecting passengers: calculated in the outbound flight.
    - Hard costs: provision is provided based on departure delay.
    - Soft costs: calculated in the outbound flight.
  - Non-connecting passengers:
    - Hard costs:
      - Provision is provided based on departure delay.
      - Compensation costs: those legally imposed to the airline by Reg. 261 based on arrival delay.
    - Soft costs: cost estimated by passengers deflecting to other airlines to the delay experienced.
- Outbound flight:
  - Connecting passengers (connection at hub): calculated in the outbound flight.
    - Hard costs: Those costs that are legally imposed to the airline.
      - Transfer fare: when any passenger misses a connection due to a late arrival of the airline, this airline must purchase a ticket for the next flight that departs to that destination. This cost is zero if the airline is from the same alliance.

- Provisions: based on the delay, a provision amount must be given to the passengers that need to wait on the terminal for the next flight.
- Compensation costs: those legally imposed to the airline by Reg. 261 based on arrival delay at the final destination.

▪ Soft costs: cost estimated by passengers deflecting to other airlines to the delay experienced.

o Non-connecting passengers:

▪ Hard costs:

- Provision is provided based on departure delay.
- Compensation costs: those legally imposed to the airline by Reg. 261 based on arrival delay.

▪ Soft costs: cost estimated by passengers deflecting to other airlines to the delay experienced.

o Rotational delay cost:

▪ Soft costs are considered due to the delay of the aircraft: It is considered that the final delay is carried over to the next operation of the aircraft with a buffer of 30 minutes. The same amount of passengers is considered and two rotations are calculated.

### a) Passengers hard costs calculation

Passengers' hard costs are based on the departure time of the next valid connecting flight. It takes into account the provisions legally required to provide the passenger by the airline, and the transfer fare that the airline must purchase to the passengers that miss their flight. The diagram in Figure 4 shows how these costs are calculated.

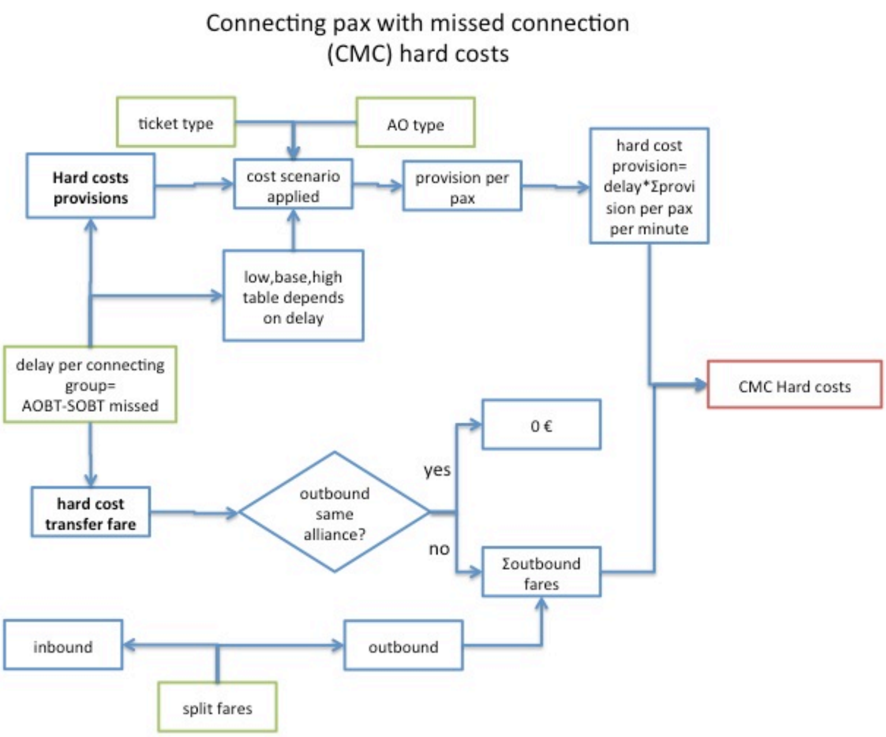



Figure 4- Diagram of hard cost computation

**(i) Hard cost provisions**

These provision costs are based on the AO type and ticket flexibility:

| AO (ticket) | Cost applied |
|---|---|
| FSC (flexible) | Average of high & base |
| FSC (inflexible) | Base |
| REG, LCC, CHT | Average of low & base |

Table 7 – Provisions costs as AO and ticket flexibility parameters

Based on the inbound flight, FSC cost scenario is applicable - use a blend of high and base hard costs for a ≥3 to <5 hour delay. Table 8 shows the cost values as a function of time for high and base costs.

Note: over all flights, 90% of inbound connecting flights are FSC.

| Minutes of delay | High | Base |
|---|---|---|
| 90 – 120 | 2 | 1.7 |
| 120 – 180 | 9.4 | 7.7 |
| 180 – 300 | 23 | 19 |
| 300 – 480 | 26 | 21 |
| 480 – Overnight | 100 | 83 |

Table 8 – Provisions costs as delay incurred

**(ii) Hard cost fare transfer**

Every passenger is assigned its own fare and whether its ticket is flexible or inflexible. All fares and ticket flexibility are supplied as input data files.

For connecting passengers, the inbound flight determines whether the whole ticket is flexible or inflexible and the fare is split to cover the inbound and outbound flights (i.e. connecting passengers have two fares). Only FSC passengers can have flexible tickets (approximately 10%) (See Table 9).

| AO type | Tickets type | |
|---|---|---|
| | Flexible | Inflexible |
| FSC (full service) | ≈10% pax | ≈90% pax |
| REG (regional) | – | 100% pax |
| LCC (low cost) | – | 100% pax |
| CHT (charter) | – | 100% pax |

Table 9 – Division between flexible and inflexible tickets per airline type

There is a cost of rebooking connecting passenger onto alternative flights – this is the outbound fare, which would be transferred to the alternative flight.

However, note: the fare transfer is cost neutral if the re-accommodated passengers are rebooked onto flights operated by the same carrier or same alliance. For example, an intended connection between Swiss1 and Swiss2 flights will produce:

- If connection with Swiss2 is missed, then SAS2 is cost neutral (both Star Alliance)
- If connection with Swiss2 is missed, then Iberia2 (different alliance) results in a cost to Swiss1

Alliance coding is being assigned to each inbound/outbound flight to the hub. Note: only the cost to airlines and are not treating fare transfers as income to the other carrier are considered.

The reallocation process is done calculating hard and soft costs for passengers on whichever is cheaper: next flight with different alliance or next flight of same alliance. For those passengers not accepted, the process is recalculated for until all passengers are reallocated or the day is finished as shown in Figure 5.

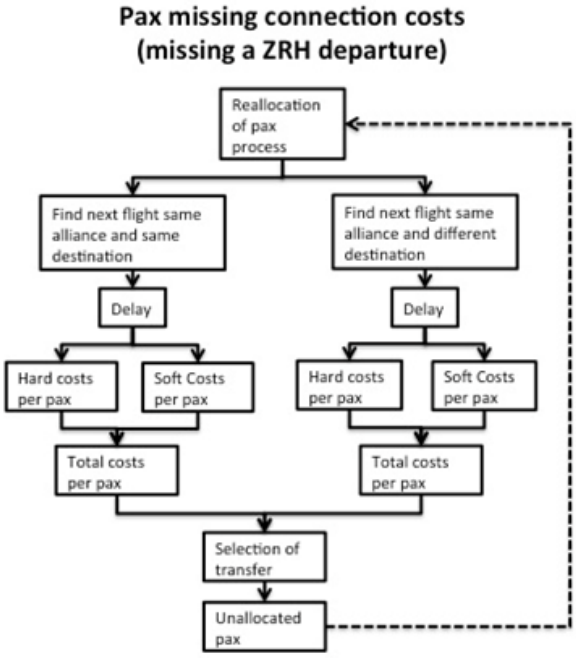



**Figure 5- Reallocation process for passengers missing connections**

### (iii) Hard cost compensation

Passenger regulations have evolved since the introduction of Regulation 261 in 2005 (Cook and Tanner, 2015). According to Regulation 261 and subsequent amendments (European Parliament, 2014), passengers are entitled to compensation when their flight is delayed on arrival. The following table defines the amount of money each passenger is entitled to. Table 10 shows the compensations that passengers are entitled as a function of the flight distance and arrival delay.

| Flight distance | Arrival delay | Compensation |
|---|---|---|
| ≤1,500 km | ≥ 180 minutes | €250 |
| 1,500 km > d ≤3,500 km | ≥180 minutes | €400 |
| > 3,500 km | 180 minutes < r ≤ 240 minutes | €300 |
| > 3,500 km | ≥180 minutes | €250 |
| ≤1,500 km | ≥180 minutes | €400 |

**Table 10 – Compensations implemented as from Reg. 261**

Not all passengers seek compensation, e.g. due to lack of awareness of their entitlement. It is estimated that 11% (University of Westminster, 2015) of passengers currently apply for compensation. The future strategy increases this estimation up to 50%, to evaluate if airlines would change DCI options when passengers were more prone to apply for compensation. This increment is in line with the current trend of increasing passengers' compensation.

- Current compensation ratio: 11 % passengers.
- Future compensation ratio: 50 % passengers.

### b) Passenger soft costs calculation

#### (i) Primary delay

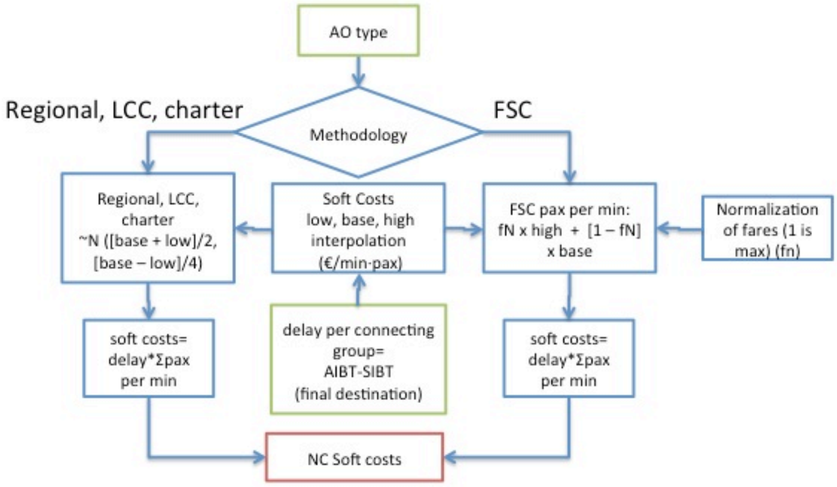



**Figure 6- Non-connecting passengers soft cost computation**

Figure 6 shows the diagram of the computation of non-connecting passengers soft costs. The soft costs will be calculated using Equation 1 with the definition of the parameters described in Table 11.

$$SC = \frac{p\left(t_{ID} - \frac{d}{V_N} + \frac{d}{V_{TAS}}\right) z \left(e^{x\left(t_{ID} - \frac{d}{V_N} + \frac{d}{V_{TAS}}\right)^y} - 1\right)}{e^{x\left(t_{ID} - \frac{d}{V_N} + \frac{d}{V_{TAS}}\right)^y} + e^{w}}$$

**Equation 1 – Soft cost computation**

| Definition | Variable | Value | Units |
|---|---|---|---|
| Cruise distance | d | depending on flight | km |
| Fuel cost | f | 0.5 or 0.8 | €/kg |
| SC a | w | 3 | n/a |
| SC b | x | 0.1 | n/a |
| SC c | y | 0.9 | n/a |
| SC d | z | 0.097 | n/a |
| Standard airspeed | n | depending on aircraft type | km/min |
| Passengers | p | depending on aircraft type | count |
| Initial delay | $t_{ID}$ | depending on situation | min |
| True airspeed | $V_{TAS}$ | depending on aircraft type | km/min |
| Nominal airspeed | $V_N$ | depending on aircraft type | km/min |

Table 11 – Variables used in soft cost equation (Equation 1)

Both, the initial and the arrival delay are considered in the soft costs. Note that the arrival delay is the one with a greatest impact on the total cost and that this delay can be recovered with delay recovery strategies.

Figure 7 shows an example of the soft and rotary cost for a full service airline with 200 passengers as a function of the final delay.

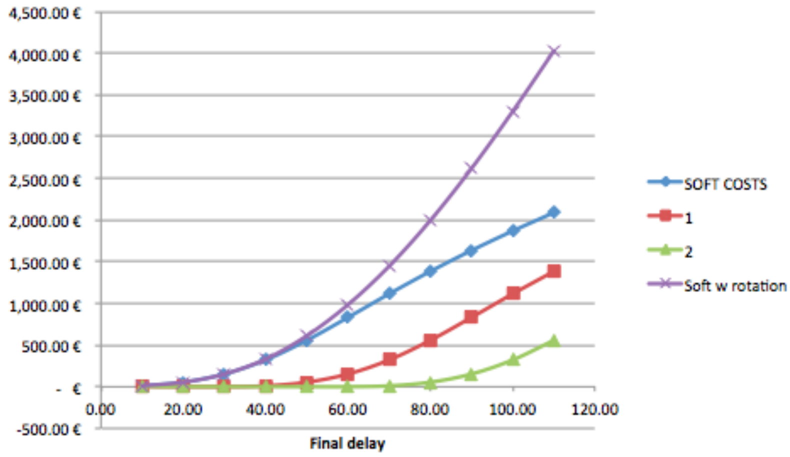



Figure 7- Example soft and rotation costs values for FSC flight with 200 passengers

### (ii) Rotary delay

Soft costs due to rotary delay is calculated by reducing the final delay of the delayed flight by a standard buffer between operations, and consider that the next flight will be affected by such reduced delay with the similar amount of passengers. For inbound flights, the rotary soft costs are calculated explicitly by using the tail number linking it with the following outbound flights. For outbound flights, 30 minutes buffer is estimated and rotary delay extend up to two rotations.

# 3 Cases of study

There are four main parameters considered when defining the different scenarios to be studied in the project:

- Air traffic
- DCI strategy
- Fuel cost
- System delay

The different options considered for each of the different parameters are as described below:

## 3.1 Air traffic

Three different air traffic-planning schedules are considered. These differences are used to model the future air traffic management improvements, since they will decrease the flight time and turnaround time at the airport. They are the following:

**a) Baseline traffic 2010 scenario:**

The original traffic data is based on a busy Friday of 2010 (20th August 2010) with flights to-from a hub airport. The traffic data has been generated combining different data sources as explained in section 4.1. Uncertainties during the different phases of the flights are modelled as explained in section 4.2.

**b) Ground improvements:**

Ground improvements are considered as a reduction of 20% of the MTT for flights at the hub, limited by a minimum of 20 minutes. For the flights that can realise a faster MTT, their SOBT has been reduced by the same amount. This means that the distribution of turnaround buffers is maintained as in the baseline traffic scenario, but faster turnarounds allow some flights to schedule shorter periods at the hub. Note that in some flights, the subsequent SOBT is reduced by a lower amount that the potential reduction of the MTT, in order to maintain all the connections within that flight, taking into consideration the MCT, as in the baseline traffic.

**c) SESAR and ground improvements:**

To the previous traffic schedule with ground improvements, the benefits of other SESAR mechanism are estimated as a reduction of their cruise phase to a GCD between TOC and TOD. The SIBT and SOBT at the hub are maintained as this allows us to keep the consistency of the connections and hub structure. Therefore, the SOBT for the inbound flights and the SIBT for the outbound flights are modified to meet the reduced cruise distances. These reductions will benefit the gate-to-gate time but will reduce the possibility of recovering part of the delay.

## 3.2 DCI strategy

Three different DCI strategies are considered as shown in Table 12. This allows us to understand the behaviour of the different airlines in tactical operations scenarios, with an optimised decision system with current passenger regulations and the effect of increasing passenger compensation claiming rates.

| Strategy | Delay recovery trigger | Minimum residual delay | Wait for passenger rules | Flights applying delay recovery | Delay costs | Fuel costs | Rationale |
|---|---|---|---|---|---|---|---|
| **Baseline** | Delay > 15 mins | Reduce as much as possible to 5 mins | If inbound flight is recovering delay and waiting time required is less than 20 mins | 10% | n/a | n/a | Simple rule similar to current operations. If delay is more than 15 min, it will try to reduce it to 5 min.<br>Simple wait for passenger rule: by default, do not wait. Only wait up to 20 minutes if passengers are missing connections, inbound flight is speeding up and waiting allows to do the connection. |
| **Cost optimal** | Delay > 0 | Driven by total cost efficiency | Driven by total cost efficiency | 100% | Assessed for all DCI options | Assessed for all DCI options | Decision driven by airline total cost (delay and fuel cost). DCI considered for all delayed flights. Optimal speed and wait for passenger decided for cost optimisation at different flight stages. Costs are assessed for all the different DCI options and the minimum cost decision taken.<br>In this case, a reduced total cost for the airline is expected to be achieved. Even if the delay for the passenger is not prioritised, the fact that the delay costs include the cost of compensation for passengers, passengers might benefit from this strategy. |
| **Cost optimal higher percentage of passengers claiming compensation when entitled by Reg. 261** | Delay > 0 | Total cost for the airline increased by increasing number of passenger claiming compensation | Driven by total cost efficiency | 100% | Assessed for all DCI options | Assessed for all DCI options | It is assumed that airlines will not be willing to increase their costs just for passenger delay reduction in all the cases. However, higher percentage of passengers claiming compensation might impact passengers' performance.<br>The total number of passengers' claiming compensation is increased following the current trend. New regulation might simplify the claiming process. Output costs can be computed with this new claiming rates; allowing us to analyse the impact of this increment on total costs, fuel (environmental impact) and passenger delay. |

Table 12 – DCI strategies considered

## 3.3 Fuel cost

The cost of fuel has decreased subtantialy in the recent year; therefore, there is low interest in considering lower values. For this reason, two values are considered: nominal (0.5 EUR/kg) and high (0.8 EUR/kg) (adapted from Cook and Tanner, 2015).

## 3.4 Delay

Three different types of delay are analysed modelling delays of days with a low, medium and high departure delay as explained in section 4.3.

## 3.5 Case of study summary

Table 13 summarises the different scenario variables and options within that variable that are considered in the project. The combination of the different options gives us a total of 54 scenarios to test.

| Scenario variable | Option 1 | Option 2 | Option 3 |
|---|---|---|---|
| **Flight database (FD)** | 2010 | Ground improvements | SESAR and ground improvements |
| **Fuel cost (FC)** | Nominal | High | - |
| **Strategy applied (SA)** | 1 | 2 | 3 |
| **Delay (ID)** | Low | Medium | High |

**Table 13 – Cases of study summary**

# 4 Datasets

Different data sources have been analysed and combined to generate the traffic (flights and passenger itineraries), the uncertainties of the system and the delays modelled in the system.

## 4.1 Traffic and passenger itineraries

### 4.1.1 Flight plan data

- **Flight schedules** are obtained from PRISME dataset.
- The **flight trajectory** and **flight phases** (climb, cruise and descend) are estimated based on so6 data file.
- Considering the length of each phase and their time, an **average ground speed** has been estimated. In eight cases, the timestamps associated with the waypoints during the climb phase presented some errors leading to average ground speeds higher than 550 kts (1,000 km/h). In all of those cases there are flights from a region outside the ECAC region where more errors could be expected on the sampling of the data (5 from 14 flights from the US, 1 flight from 2 from Canada, 1 flight from Singapore and 1 flight from Johannesburg). For those flights, the climb time was modified to estimate realistic climb performances, similar to other flights with same aircraft type.

### 4.1.2 Taxi times

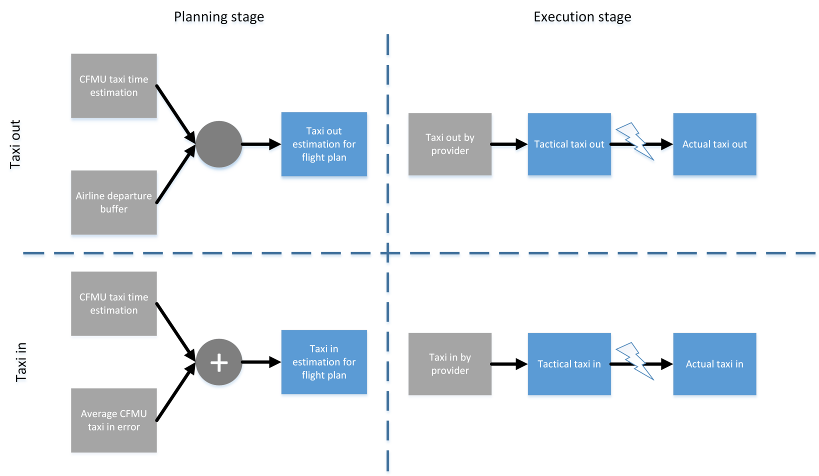



**Figure 8- Taxi times estimations**

As shown in Figure 8, for each taxi time (taxi in and taxi out) two different reference values were required. The first one is the taxi time that the airline uses as estimates of the taxi times at planning stage. This taxi time is based on CFMU taxi times, but modified (considering average reported taxi times and airline schedule buffers) to be as close as possible to the working taxi times considered by airlines. Note that these values are used when estimating the arrival time at the destination gate and therefore estimating the delay of the flight to decide the DCI strategy to use.

The most specific CFMU taxi times available were considered, Table 14 shows the percentage of flights for an amount of airports based on the data available.

| CFMU taxi times available | Percentage flights for taxi out | Percentage flights for taxi in |
|---|---|---|
| CFMU hourly reported taxi times for flights to-from the hub | 41.5% departing flights (at 71 airports) | 41.1% arriving flights (at 70 airports) |
| CFMU hourly reported taxi times | 54.1% departing flights (at 17 airports (including from the hub)) | 54.3% arriving flights (at 17 airports (including to the hub)) |
| CFMU seasonal reported taxi times | 4.0% departing flights (at 6 airports) | 4.3% arriving flights (at 6 airports) |
| Data not available | 0.3% departing flights (at 1 airport) | 0.3% arriving flights (at 1 airport) |

**Table 14 – Percentage traffic and amount of airports in CFMU origin data**

As mentioned, these CFMU taxi times were defined considering all the data available. For the taxi out, the duration of the flight plan from take-off to landing was compared with the duration of the flight plan considering the EOBT instead of the take-off time. In this manner, an estimated taxi out time was computed. This estimated taxi out time is close to the CFMU taxi time reported as in Table 14, only if the estimation is negative (this happens for two flights in the dataset) then the CFMU is considered. Figure 9 shows the difference between the estimated taxi out and the reported by CFMU.

For the taxi in, it is worth noticing that for some airports there is a systematic overestimation of the taxi times reported by the CFMU and the ones provided at post-operations by the airlines. It is reasonable to consider that airlines will take this average "taxi estimation error" when defining their internal taxi times. As shown in Figure 9, the taxi time considered in this manner most of the time is more optimistic than the reported CFMU taxi in times.

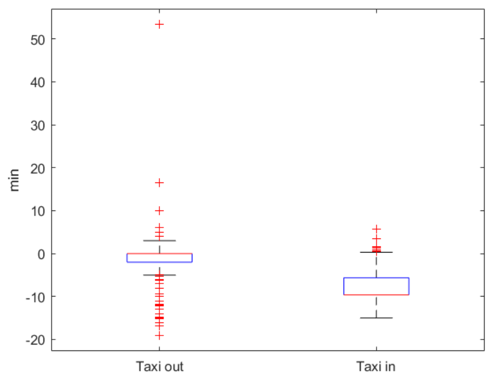



**Figure 9- Difference between estimated taxi times and CFMU planning taxi times**

During the simulation, the actual taxi times that each individual flight experienced were modelled based on the taxi out and taxi in data provided by airlines to CODA adding some stochasticity, as CODA data is aggregated in hourly intervals. The closest estimated taxi time reported for the airport was considered; if that value was not available, then the average CFMU for the season was assumed (this was the case for only 29 flights for taxi out and 31 flights for taxi in). As presented in Figure 10, the difference between the estimated taxi times at the planning stage and the tactical taxi times reported by airports on post operation is small but allows us to achieve a more realistic model. For taxi out, the greatest difference was 53 minutes for a flight from Atlanta where the estimated taxi out was 77 minutes while the provider for that time was only 24 minutes. On the other end there is a flight from Brussels which estimated taxi time was 12 minutes while the provider was 51 for the hour when the flight operates leaving a delay of 39 minutes on departure due to taxi estimation.

Finally, as these actual taxi time values are based on reported taxi times but at an aggregated level, noise will be added by generating values following an normal distribution of σ=1 min.

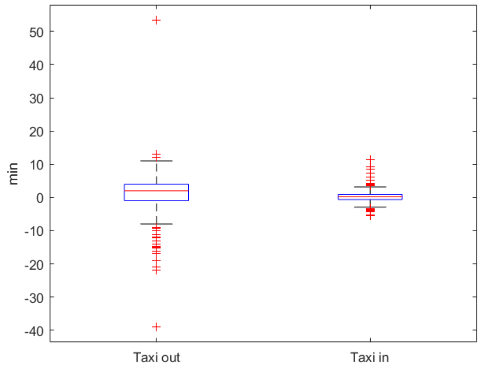



Figure 10- Difference between estimated taxi times and tactical planning taxi times

### 4.1.3 Cruise speed and wind estimation

If the average groundspeed is considered as the nominal true airspeed during the cruise, 19.0% of flights (129 flights) would be operating faster than their VMO and 5.7% of the flights (39 flights) would be cruising slower than their minimum operating speed. For this reason, instead of using the average cruise speed as the true airspeed, the nominal airspeed as indicated by BADA was considered.

This nominal airspeed in BADA is indicated as a Mach number, which means that if the flights are very short, as they do not have time to reach a higher cruising altitude, the airspeed in knots might be higher than the VMO for the aircraft at that altitude. This is the case for 26 flights (3.8% of the dataset); in all of these cases, the flight plan was short (between 100 and 200 NM), which means that it is not possible to recovered delay during the cruise even if the nominal airspeed is reduced. 26 other flights have a nominal airspeed between 0.99*$V_{max}$ and $V_{max}$, and hence there was no margin to increase the airspeed to recover delay; once again, this was mainly for short flights. Even if the impact on delay recovery was small, modelling the nominal airspeed out of the aerodynamics of the aircraft might lead to unrealistic fuel consumption estimations. For this reasons, for those 26 flights where the nominal airspeed is higher than VMO, this nominal airspeed was modified to 0.98*$V_{max}$. Figure 11 shows, for a given aircraft model, the nominal airspeed adjusted for all the flights with a flight plan lower than 200 NM, which originally were expected to be operating at 1.11*$V_{max}$. Note also that VMO might be different at different flight plan distances as different cruising altitudes were considered.

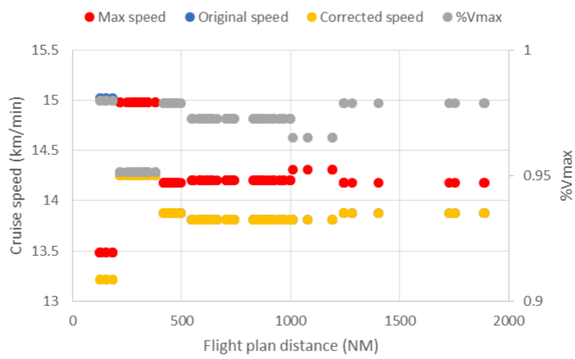



Figure 11- Modified nominal speed to do not overpass the $V_{max}$

Figure 12 presents the nominal airspeed as a percentage with respect to the $V_{max}$ before and after correcting the nominal airspeed bounded by the VMO.

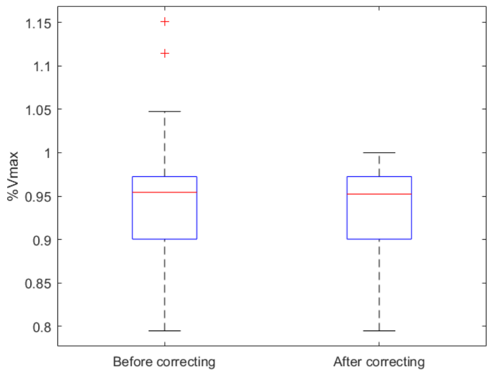



**Figure 12- $V_{nom}$ as a percentage of Vmax before and after correcting abnormally high $V_{nom}$**

By comparing the average groundspeed and the estimated true airspeed, the average cruise wind component is estimated. Figure 13 shows the average wind component estimated for the flights in knots. It ranges between about 100 kts of positive, tailwind, to about 100 kts of negative, headwind.

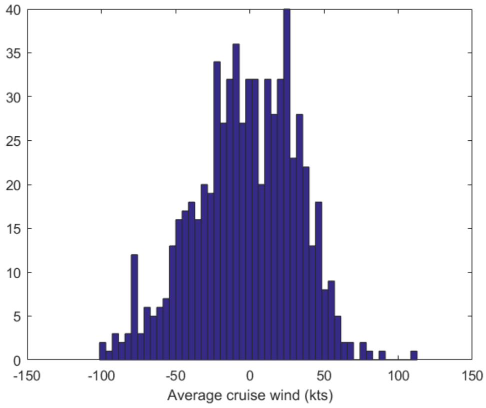
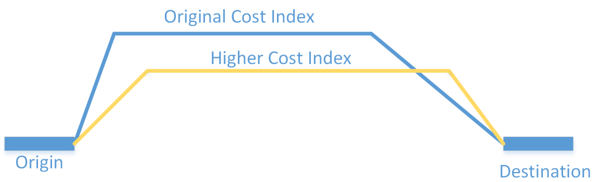


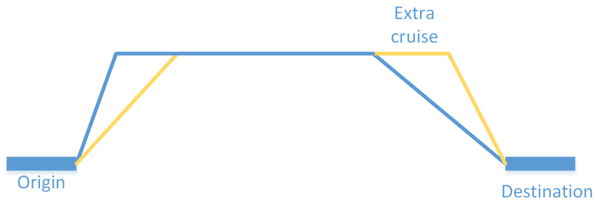

**Figure 13- Average cruise wind estimation**

## 4.1.4 Difference between cruise airspeed variation and DCI

When the cost index of a flight is increased, not only the cruise airspeed is modified but also the whole trajectory might be affected. As depicted in Figure 14 a higher cost index, leads to a less steep climb, a sharper descent and generally a longer cruise phase. In some cases it can even have an impact on the optimal flight level, generally a lower flight level is preferred (see Figure 14(a)). In this project, the decision of increasing the airspeed to recover delay is executed once the flight reaches its TOC, therefore, the option of selecting a different altitude than the nominal is not considered. However, as shown in Figure 14(b), if the cost index is increased, there will be an extra cruise length that could be used to recovered delay. The descend speeds would also be modified, but as at that point the AMAN negotiation will be carried out, that phase is not considered in the delay recovery strategy.




**(a) Full trajectory modified**




(b) Same level maintained

**Figure 14- Effect of increase in cost index on trajectory**

For each flight in the simulation, nominal cruise airspeed, based on BADA values, and nominal average cruise weight were considered as explained in (SESAR, 2014). Based on this data and using Airbus Flight Plan tool, flight plans where the flight level and cruise airspeed were set as in the dataset. Flight plans with maximum cost index were also created for those flights on same conditions: same take-off weight and cruising altitude. The two flight plans of each flight could be compared to estimate the extra cruise distance as show in Figure 15. These extra cruise distances can be approximated by a normal distribution of parameters μ=7.60 and σ=2.15.

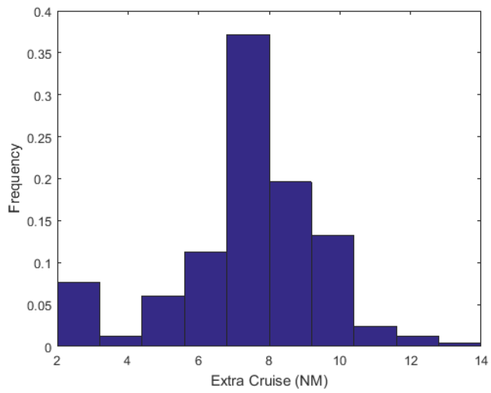



**Figure 15- Extra cruise due to higher cost index selected**

These extra cruising distances were bounded by a minimum of 2 NM and a maximum of 18 NM. These values were reduced from the descent phase, which was shortened. If the extra cruise distance estimated was longer than the cruise distance, then it will be bounded by half of the descend distance available.

### 4.1.5 Passenger itineraries

Individual passenger itineraries were modelled for each flight based on anonymous airport connection data.

## 4.2 Uncertainties

Besides the departure delay, uncertainties were modelled for the different phases of the flight. As show in Figure 16, there is uncertainty with respect to the actual off block time (AOBT) that might be delayed with respect to the scheduled off block time (SOBT). Once the flight is in the air, the climb phase will suffer from performance uncertainties and from the effects of the departure TMA leading to some variability on the arrival to the reaching of the cruise (ARCT) that might differ from the estimated time to reach the cruise (ERCT). During the cruise there is uncertainty due to meteorological conditions and path modifications, which lead to uncertainty on the time when the aircraft will be affected by the AMAN, i.e., 1h00 before the passing time over IAF (EPTI).

Finally, note that there is uncertainty on the taxi times, i.e., difference between scheduled and actual taxi times, as presented above, and taxi time uncertainties, which lead to uncertainties on the actual take of time (ATOT) and the actual inbound time (AIBT), being ATOT the AOBT + taxi out and the AIBT the ATA + taxi in.

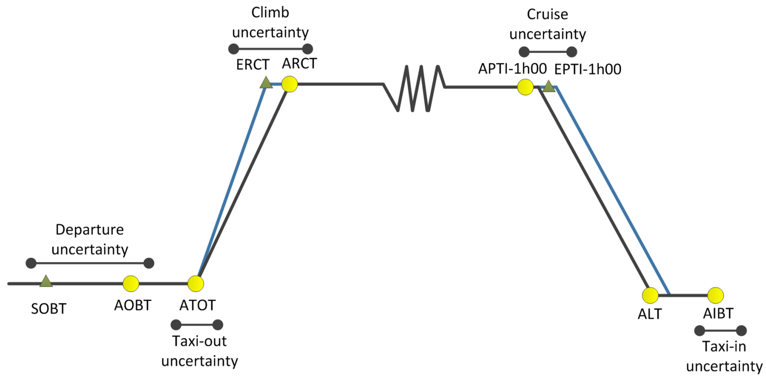



Figure 16- Flight delay and uncertainty modelled

### 4.2.1 Taxi uncertainty

For each taxi time at the execution stage, a deviation was added. This deviation was based on the standard deviations (σ) reported by IATA for inbound and outbound taxi times for the airports. For outbound flights, this deviation was aircraft category-dependent (heavy or medium). For taxi-in, this deviation was airport-dependent. Thus, for each flight, a normal distribution centred at the execution taxi time with standard deviation from the reported by IATA was used to estimate the actual taxi times. The minimum and maximum taxi times were bounded by a minimum of 2 mins (at hub min taxi in tactical stage 4 minutes and min taxi out tactical stage 7 minutes) and maximum of 2 σ to avoid too small or too long taxi times.

Note that taxis are only computed on the HUB airport, either for inbound and outbound flights. Hence, the unique taxi model.

### 4.2.2 Airborne uncertainty

Once the aircraft was airborne there were two points where uncertainty was modelled:

- the Actual Reaching Cruise Time (ARTC) and
- the Actual Passing Time over IAF - 1h00 (APTI-1h00) (i.e., when the aircraft entered the AMAN domain).

At the ARTC the airline was notified and a new cost index could be assigned to the flight. At APTI-1h00 the aircraft entered the scope of the AMAN and the negotiation of the slots was carried out.

**a) Climb uncertainty**

In order to generate the uncertainties during the climb phase, the difference between the estimated time required from take-off to reaching FL180 according to the finally submitted flight plan and the actual time required to reach FL180 from departure for all the flights going to the hub during the period AIRAC 1313 to AIRAC 1413 (i.e., 12 December 2013 to 07 January 2015) were analysed. These differences captured the uncertainties during the climb phase including the TMA procedures. The differences in time are presented in Figure 17, which are approximated with the normal distribution defined in Table 15.

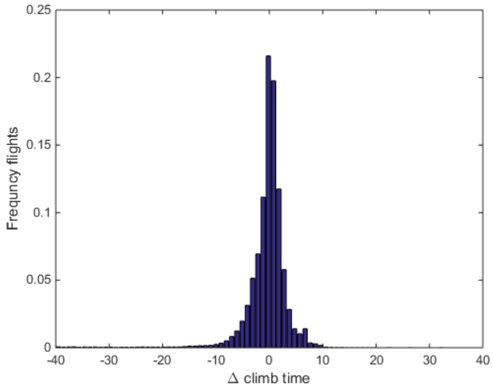



Figure 17- Time variability on climb phase at reaching FL180

| μ mean | σ standard deviation |
|---|---|
| -0.4 | 4.3 |

Table 15 – Variability on climb phase Normal distribution parameters

### b) Cruise uncertainty

Following the same principle as in the climb uncertainty, the estimated time from passing FL180 in climb until passing FL180 on descent were analysed. In this manner the difference between planned and executed cruise time was estimated as shown in Figure 18, which can be approximated with a normal distribution of parameters (μ=-1.2, σ=6.5). This means that 95% of the values are in the range -14.3 to 11.7 min.

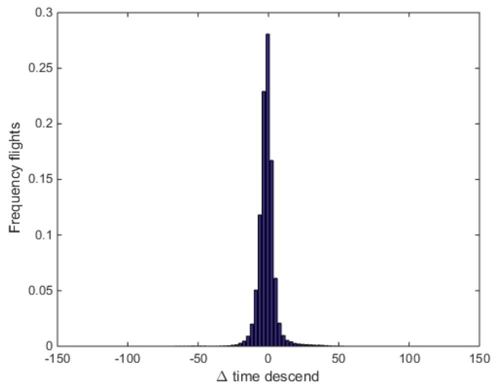



Figure 18- Difference between planned and actual time to cruise from FL180 in climb to FL180 in descend

This methodology has, however, some problems for DCI-4hD2D project. This difference in time accounts for uncertainties on weather and planned and actual route, but it is also affected by tactical adjustments of airline airspeed profiles, which is, precisely, what will be modelled in this project. Therefore, the analysis of the distance between FL180 in climb until FL180 in descent was carried out, doing a comparison between the finally submitted flight plan and the actual flown for all the flights inbound to the hub in the AIRAC 1313 to AIRAC 1413 period. Figure 19 shows these differences on flight distance. Table 16 presents the parameters of the normal distribution that is fitted to the data. This variability in distance will lead to an uncertainty on flight time for the cruise that will depend on the flight speed. As a comparison with the difference between planned and actual flight times, with this methodology, 95% of the values will be in the -49.6 to -25.2 NM, leading to a time variability of -6.6 to 3.4 min for a flight cruising at FL360 at M0.78.

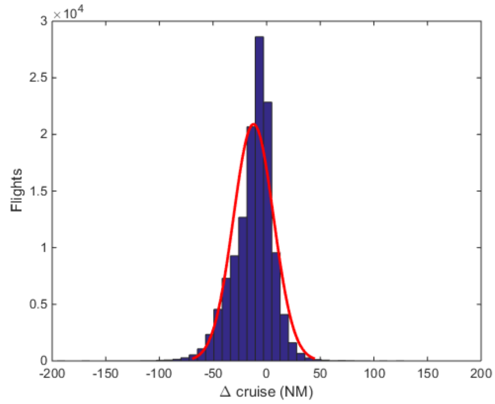



Figure 19- Differences in cruise distance between actual and planned from passing FL180 in climb phase until passing FL180 in descent

| μ mean | σ standard deviation | 95% values (in time (min) at FL360, M.078) min | max |
|---|---|---|---|
| -12.2 | 18.7 | -49.6 NM (-6.6 min) | 25.2 NM (3.4 min) |

Table 16 – Variability on cruise Normal distribution parameters

## 4.3 Off-block delays

For each flight, the airline has the schedule off block time (SOBT), however, the estimation of the off block time (EOBT) changed as the flight was affected by delay leading to the actual off block time (AOBT). In this project three different delay scenarios were modelled: low, medium and high delay for the inbound and outbound traffic. To estimate the departure delay CODA data was analysed. CODA data contains the information of the difference between the SOBT and the AOBT.

The data of all the flights arriving and departing from the hub during 2014 were analysed. For each day the average delay per flight (considering inbound and outbound flights) was computed (see Figure 20). The different days were grouped in three categories: days within the 25 quantile of average delay per flight (low delay days), days within the 25 and 75 quantile (medium delay days) and days over the 75 quantile (high delay).

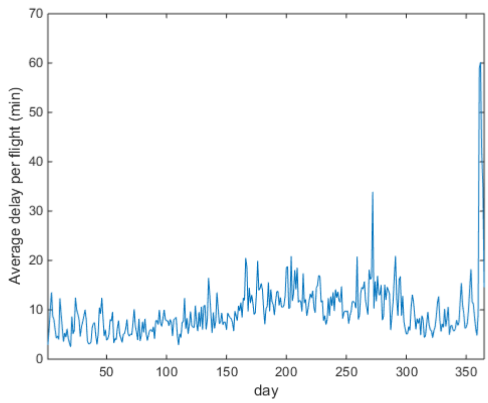
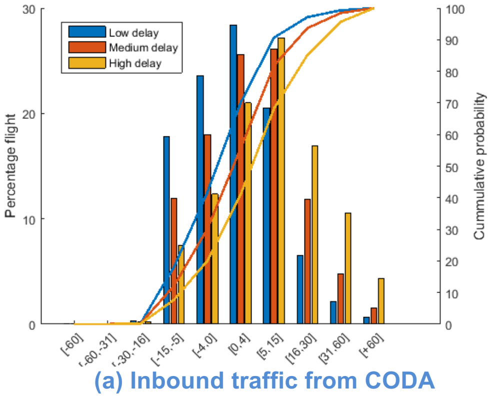
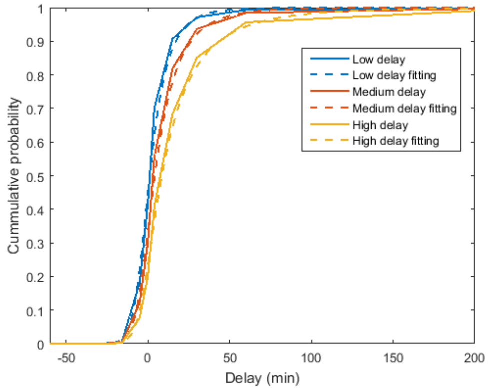



Figure 20- Average delay per flight to the hub

Figure 21 presents the frequency of inbound flights to the hub for the three categories of day with the experimental cumulative distribution.



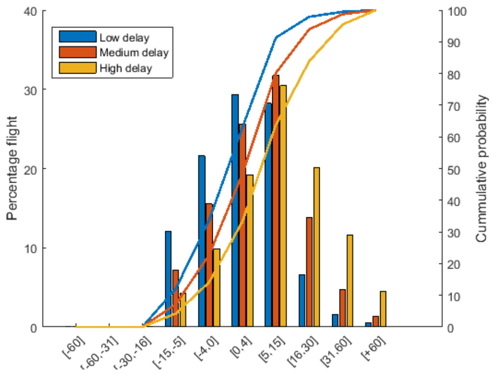

(a) Inbound traffic from CODA



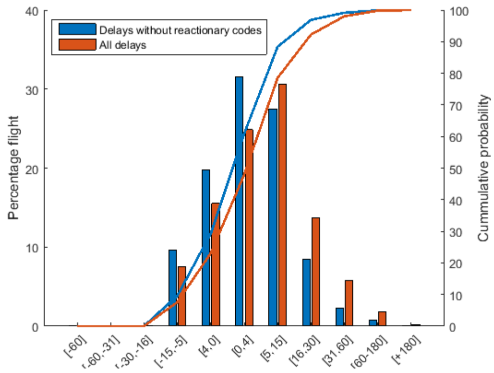

(b) Fitting of inbound traffic

Figure 21- Delay for inbound traffic

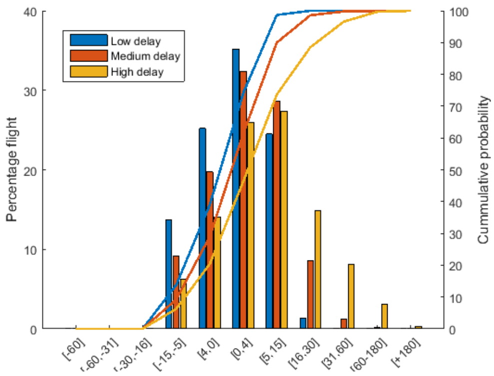
Figure 22(a) shows the distribution of outbound flights on the different delays according to the analysed CODA data. However, the turnaround process at the hub airport was modelled, therefore reactionary delays at the hub were explicitly considered. Therefore, to avoid double counting the reactionary delay, Figure 22 (b) shows the difference between the total delay generated and the delay when reactionary delays (codes 91-96) were removed from the data. After adjusting the sampling of the delay data, the delay due to reactionary reasons was subtracted to the total outbound delay. Figure 22 (c) presents the distribution of delays for the three days without considering reactionary delays and Figure 22 (d) the fitted distributions for the three-day types considered. Hence, for outbound flights the delay considered is the maximum between the delay following these distributions and the potential reactionary delay experienced by the flights.



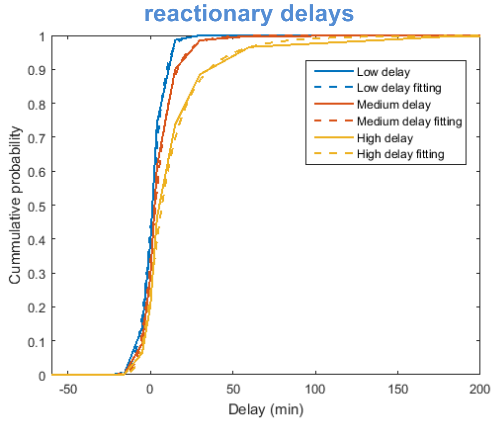

(a) Delay distribution (all causes)




(b) All delay (all causes) and delay without reactionary delays




(c) Delay distribution corrected, estimated without reactionary delays




(d) Fitting of delay distributions without reactionary delays

Figure 22- Delay for outbound traffic

The different delay probabilities have been fitted with a Burr distribution as shown in Figure 21(b) and Figure 22 (d). Table 17 presents the parameters of the distributions for the total delay for the flights that have been shifted by Δx; these delays are bounded in the [-30, 240] min range.

| **Inbound traffic** | **Probability distribution** | **α scale parameter** | **c 1st shape parameter** | **k 2nd shape parameter** | **Δx (min)** | **mean delay (min)** |
|---|---|---|---|---|---|---|
| **Low delay** | Burr distribution | 65.13 | 16.24 | 0.52 | -68 | 3.1 |
| **Medium delay** | | 69.84 | 17.68 | 0.37 | -73 | 7.8 |
| **High delay** | | 58.85 | 14.98 | 0.27 | -61 | 16.0 |
| **Outbound traffic** | **Probability distribution** | **α scale parameter** | **c 1st shape parameter** | **k 2nd shape parameter** | **Δx (min)** | **mean delay (min)** |
| **Low delay** | Burr distribution | 65.37 | 14.58 | 1.36 | -62 | 1.3 |
| **Medium delay** | | 69.82 | 18.86 | 0.57 | -70 | 4.6 |
| **High delay** | | 60.32 | 18.32 | 0.26 | -63 | 12.8 |

Table 17 – Total delay fitting distribution parameters

For inbound flights the delay (DD) was generated following the distributions, and the AOBT is computed as SOBT + DD. For the outbound flights, the awareness of the airline of the delay that will be experienced was modelled. In this manner, the airline estimation of the departure delay is refined as the actual departure time was closer. This modelling gives a more realistic approach to the DCI and wait-for-passenger decision-making process. If the airline already knows that a connecting outbound fight is delayed there might not be an incentive to increase the cost index on a delayed inbound flight; but this information of the departure delay is refined as the actual departure time is closer in time. Figure 23 presents the different stages on which the delay was communicated to the airline for outbound flights. At a given time between [SOBT-4h00 and SOBT-0h15], the EOBT of the airline was estimated to be $EOBT_1$, then this estimated departure time was modified at a time between [$EOBT_1$-1h00 and $EOBT_1$] leading to the actual $EOBT_2$, which in turn had some final uncertainty following a normal distribution of $\mu=EOBT_2$ and $\sigma=3$ min.

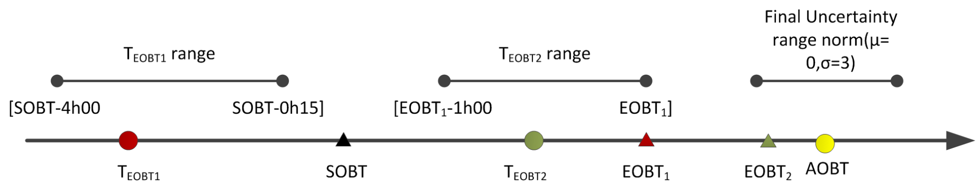


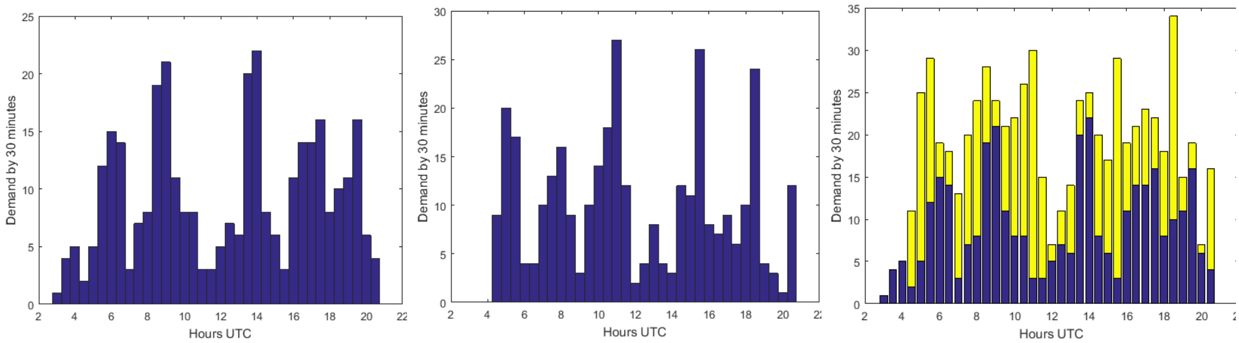

Figure 23- Initial delay generation and awareness for outbound flight

# 5 Input data analysis

The information from the different datasets was analysed to obtain some information to tune the simulation parameters and to obtain preliminary results.

## 5.1 Traffic demand

Figure 24 presents the arrival and departure planned demand at the hub runway at 30 minutes intervals with the original traffic data. The arrival and departure follows a wave pattern at as can be appreciated in Figure 24(c). For this reason, the maximum demand in a 30 minutes interval for arrivals is 22 acc/30' minutes and for departures is 27 acc/30' but the combined demand is 34 acc/30' being in general lower than 25 acc/30'. After this analysis, it seemed adequate to use the capacity of the airport alternatively for arrivals and departures to meet the demand. Therefore, independent capacity could be considered for departures and arrival fixed at 20 acc/30'. Note that the analysis is based in a busy day but we do not want to generate non-realistic arrival delay due to excessive lack of capacity. If the demand was s higher than the capacity an ATFM regulation would be implemented adjusting the demand; as we are not modelling these regulations, the capacity should be high enough as to prevent unrealistic tactical delay generation.




(a) Arrival demand (b) Departure demand (c) Total demand

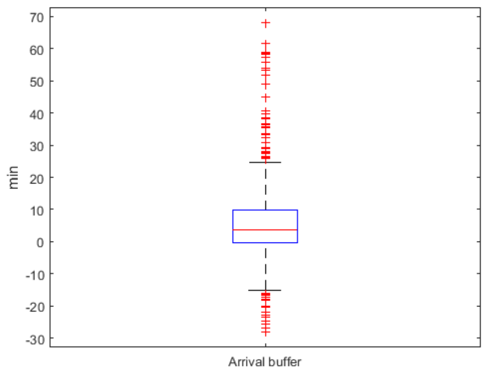
Figure 24- Initial demand at the hub in 30 minutes windows

## 5.2 Buffers

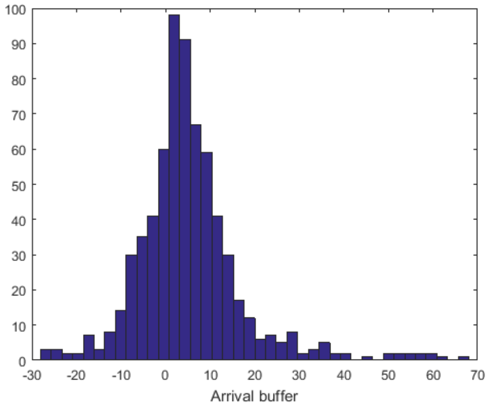
There are two buffers that are present on the flights: arrival buffers and turnaround buffers.

### 5.2.1 Arrival buffers

The arrival buffers are defined as the difference between the scheduled block times (SIBT - SOBT) and the planned gate-to-gate flights (estimated taxi out + flight plan duration + estimated taxi in). In general airlines plan a shorter gate-to-gate trip than their published scheduled times. This creates a buffer to deal with uncertainties and delay. If these buffers are not modelled all the flights with a single minute of delay will be already delayed. Figure 25 presents the values of these buffers. For 72% of the flights some positive buffer exists. There are, however, some flights, 28%, that would arrive delayed even if on time, this might be due to operational constraints during the route, note that only 2.7% of the flights would arrive with a delay greater than 15 minutes.




(a) Boxplot



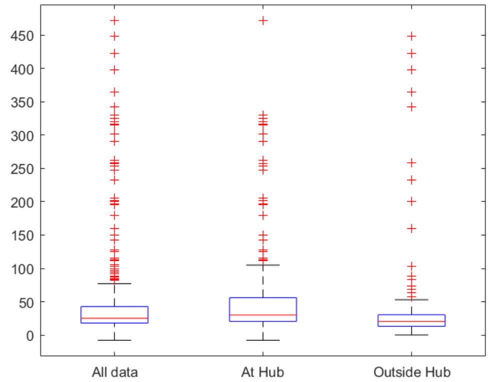

(b) Histogram

Figure 25- Arrival buffer at destination

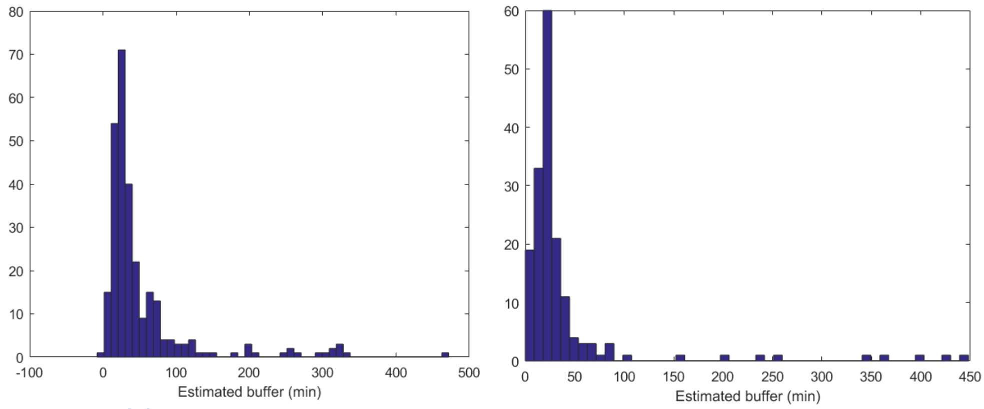
## 5.2.2 Turnaround buffers

A minimum turnaround time (MTT) was defined for each aircraft type based on the airline type (FSC, LCC, REG or CHT), the wake turbulence (i.e., size) of the aircraft and if the airline was the hub airline. These values were extracted from (SESAR, 2013) and bounded by a lower limit of 20 minutes.

The turnaround buffers were defined as the time between an SIBT and a subsequent SOBT for the same aircraft type considering the MTT. These buffers reduce the propagation of delay, i.e., reactionary delay, at the airport. Figure 26 show the distribution of these buffers for flights in the original data. As observed, for flights at the hub in general the buffers are higher. This is consistent with fast turnaround at the hub and with margin to absorb delay considered. Note that for flights outside the hub there are more outliers, the reason might be because itineraries of those flights are not analysed as only flights to-from the hub are considered. For flights in the hub the median values of the buffer is 28 minutes with values between 53 and 19 minutes (75th and 25th percentile respectively), for turnaround outside the hub the median is 18 minutes with values between 28 and 13 minutes (75th and 25th percentile respectively).




(a) All flights and comparison flights at the hub and outside the hub




(b) Flights at the hub (c) Flights outside the hub

**Figure 26- Buffer in schedules in original data**

## 5.3 Effects of ground improvement

The ground improvements mean that the MTT of flights operating at the hub have been reduced by 20%, limited by a minimum of 20 minutes. As presented in SESAR (2014), some airports have been able to reduce their MCT for some operations between 18% and 25%; however, the MTT is limited by the critical path of the different procedures required which limits, in practice, the possible reduction. Note that the analysed hub is already operating with A-CDM procedures. From all the flights arriving to the hub, 313 flights are able to reduce their turnaround time (92.0% of the arriving flights). The subsequent SOBT was reduced by the same amount but maintaining the connection of passengers, i.e., ensuring that all the passengers were able to meet their connection. For this reason, 201 flights have a reduced subsequent SOBT. The remaining flights increased their buffer in an average of 4 minutes. Figure 27 shows the number of flights reducing their MTT and their subsequent SOBT reduction at the hub. From the flights that reduce their SOBT, 78.6% reduce it by less than 5 minutes, 13.9% between 5 and 10 minutes and 7.5% between 10 and 20 minutes.

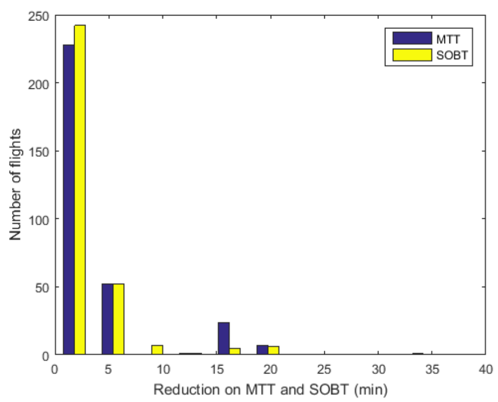



**Figure 27- Reduction of MTT and SOBT due to ground improvements**

## 5.4 Maximum potential delay recovered

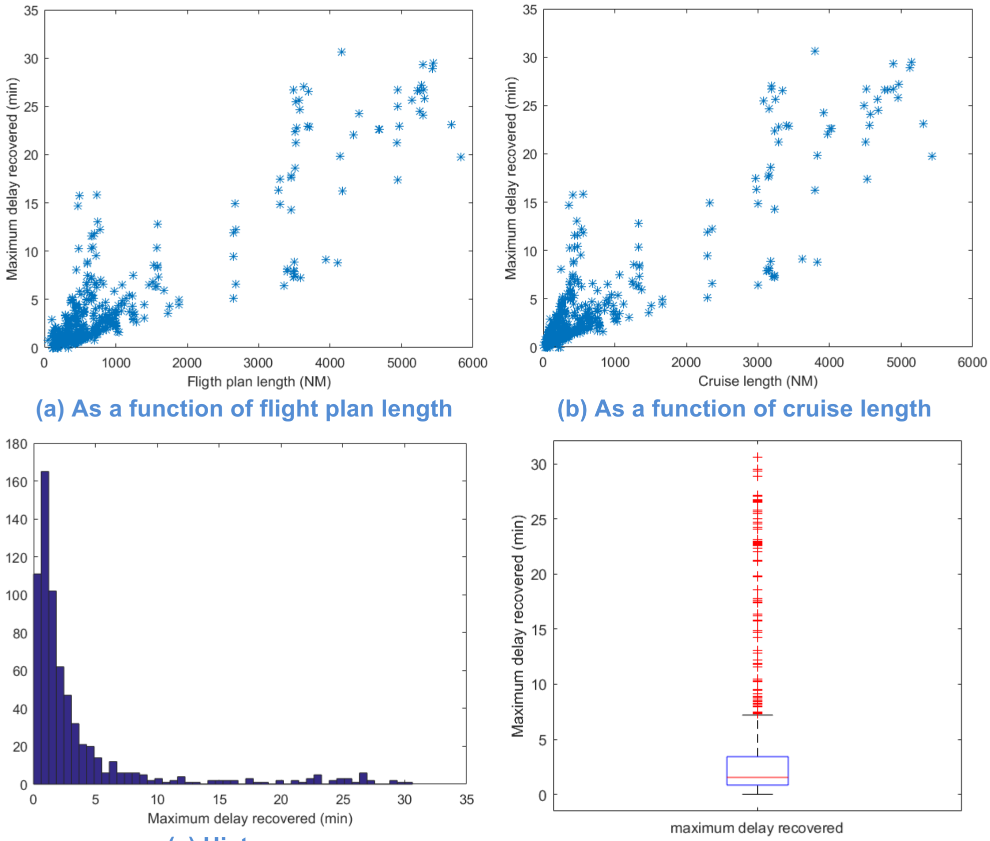
### 5.4.1 Considering original flight plan data

The delay that can be recovered during the cruise phase by speeding up the aircraft is estimated as indicated in Equation 2.

$$T_{rec} = \frac{Cruise\ Distamce}{(V_{nom} + wind)} - \frac{Cruise\ Distamce}{(V_{selected} + wind)}$$

**Equation 2 – Delay recovered during cruise phase**

If $V_{selected}$ is set to the VMO the maximum potential delay that can be recovered can be estimated. Figure 28(a) shows the maximum delay that could be recovered for the modelled flights as a function of the flight plan length. As expected, longer flight plans lead to higher potential delay recovery. In Figure 28(b) these values are presented with respect to the cruise length where this relationship is clearer. Note that as indicated in Figure 28(c)-(d), the majority of the delay that could be recovered is bounded between 7 and 0 minutes (3 minutes at the 75th percentile).




(a) As a function of flight plan length

(b) As a function of cruise length

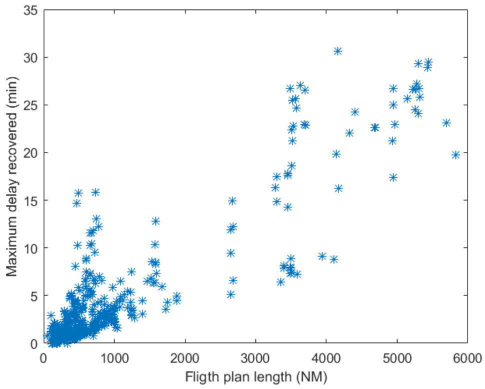
(c) Histogram

(d) Boxplot

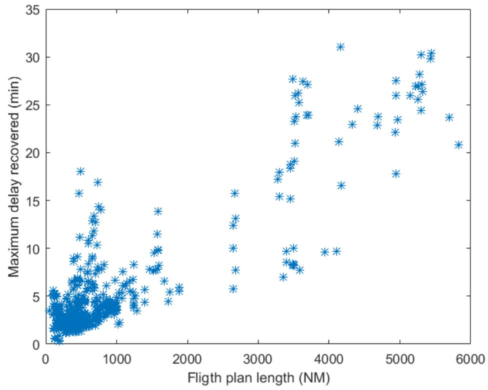
Figure 28- Potential maximum delay recovered

### 5.4.2 Difference between cruise airspeed variation and CI variation

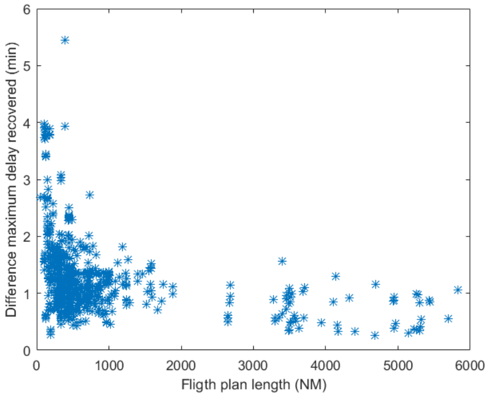
As shown in section 4.1.4, there is a difference between just increasing the cruise airspeed or increasing the DCI; this difference is modelled as an increment on the cruise distance available and a reduction on the descent distance. Figure 29 shows the maximum recovery delay estimated with this consideration. As shown in Figure 29(c), if the extra recovery is rounded to the nearest minute, the majority of the flights increase their maximum delay recovered by one minute (72.93% of the flights); note also that the flights that benefit the most from this cruise increase are the flights with medium and short flight plans, e.g. all the flights that benefit with 3 or more minutes have flight plans shorter than 750 NM, the reason is that for those flights their average descend airspeed is usually lower than their cruise airspeed, and therefore transferring slow descend into faster cruise leads to higher benefit in extra recovery.




(a) Without extra cruise




(b) With extra cruise



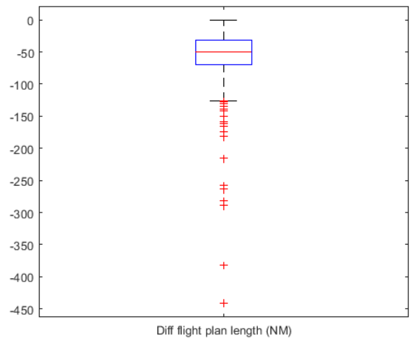

(c) Difference between with and without extra cruise

Figure 29- Potential maximum delay recovered with extra cruise

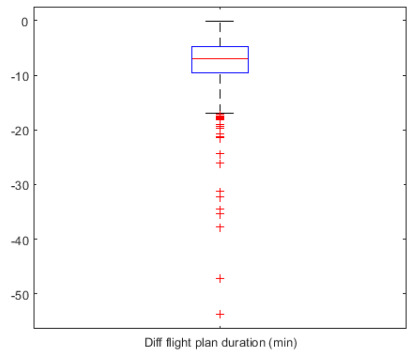
### 5.4.3 Impact of SESAR improvements on maximum potential delay recovered

As modelled, SESAR improvements represent a reduction on the flight plan distance and flight plan duration, which leads to shorter gate-to-gate trips. On the other hand, the maximum delay that can be recovered by speeding up during the cruise is also reduced leading to, a potential reduction on the resilience to recover delay.

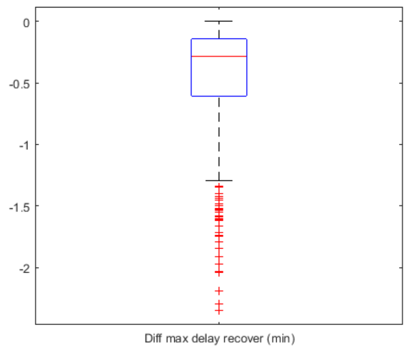
Figure 30(a) presents the reduction of the flight plan length due to the SESAR improvements. There is a mean reduction of 56 NM (with a median of 50 NM, 25% percentile at 70 NM and 75% percentile at 31 NM). This leads to a reduction of the flight plan duration as shown in Figure 30(b), with a mean reduction of 8 minutes (with a median of 7 minutes, 25% percentile 9.6 minutes at and 75% percentile at 4.6 minutes). The reduction on the flight plan distance leads to a reduction on the potential delay that can be recovered that, as shown in Figure 30(c) is not very high (mean reduction of 0.4 minutes). Therefore, we are expecting to obtain a mean reduction on the gate-to-gate traffic of 8 minutes with a lost on the maximum delay that can be recovered smaller than 1 minute.




(a) Flight plan distance reduction



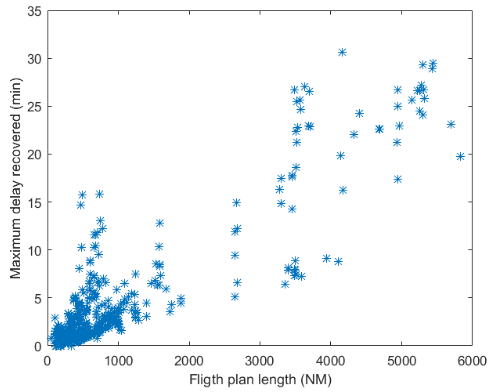

(b) Flight plan duration reduction



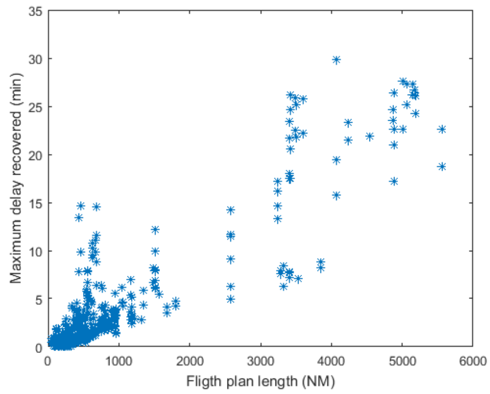

(c) Maximum potential recovered delay reduction

Figure 30- Comparison between original traffic and SESAR improved version

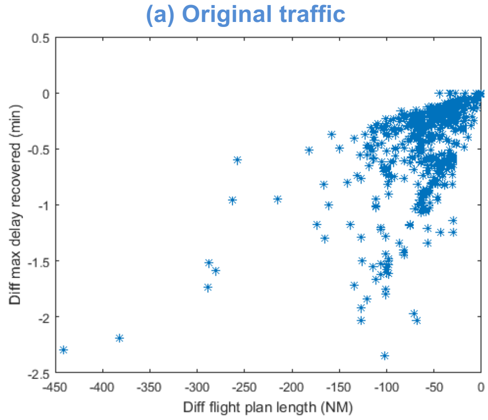
Figure 31 compares the maximum potential delay that can be recovered by speeding up during the cruise with the original demand (Figure 31(a)) and with the SESAR improved version (Figure 31(b)). As shown in Figure 31(c), there is a relationship between the reduction on the flight plan length and the reduction on the maximum delay that can be recovered. Finally, Figure 31(d) shows the relationship between the maximum delay that could be recovered in the nominal scenario and the reduction on delay that is experienced in the SESAR improved version.




(a) Original traffic




(b) SESAR improved traffic




(c) Difference delay recovered vs. difference flight plan length


(d) Difference delay recovered vs. maximum delay recovered original

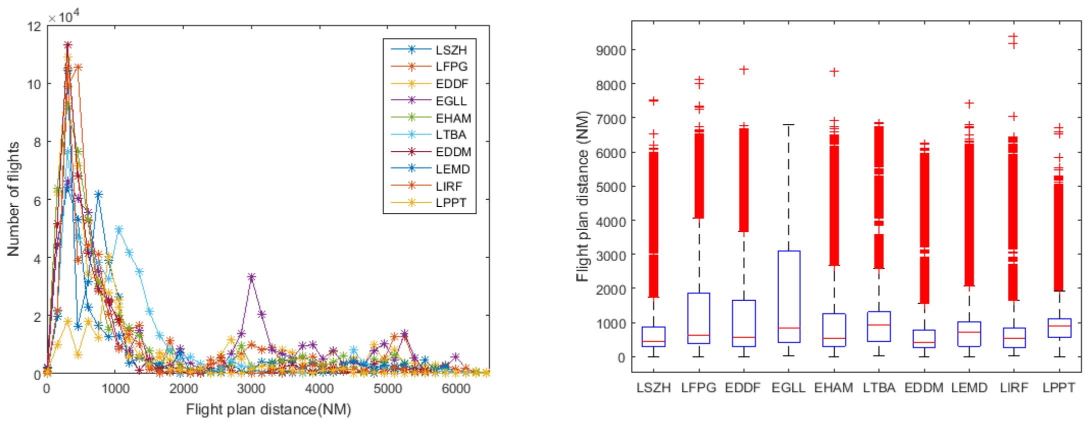
Figure 31- Potential maximum delay recovered with extra cruise

## 5.4.4 Effect of hub location and demand on maximum delay recovered

As previously shown, the length of the flight plan has a critical impact on the potential total delay that can be recovered by DCI. The hub airport under study is located in the centre of Europe, which affects the distribution of flight plan distances of the demand. Figure 32 shows the location of main hub airports in Europe that could potentially implement the DCI strategy.


Figure 32- Location of main hubs in Europe

The distribution of flight plan distances submitted operating at the airport for year of traffic has been analysed for those airports (from AIRAC 1313 to AIRAC 1413 (12/12/2013 to 07/01/2015)). Figure 33 (a) shows the number of flight plans per flight plan distance and Figure 33 (b) the boxplot of the distribution of the flight plans distance as a function of the airport. As observed an airport such as LTBA could be a good candidate to implement the strategy as it has a high mean flight plan distance, while EGLL benefits from the long haul flight from the US. Other airports such as LIRF, LEMD or LSZH even if are served with some long haul flights, the majority of the traffic is relatively short not allowing to exploit the potential of delay recovery through DCI.




(a) Flights as a function of flight plan distance (b) Distribution of flight plan distances by hub

Figure 33- Distribution of flight plan distances at European hubs for period AIRAC1313–AIRAC1414

# 6 Metrics

For each flight in the model a set of indicators are computed. Table 18 presents 40 of the 140 indicators computed per flight (the complete list is described in Appendix A). Using those flights indicators, performance indicators are assessed per simulation.

Table 19 describes the 22 performance indicators that, for each scenario, are divided in three categories: delay, costs and efficiency. The grouping of the performance indicators into these categories is presented in Table 20.

- Delay performance indicators are divided between flight and passengers' performance. Within this category are considered the delay recovered and the wait-for-passenger metrics.
- Costs are considered for the different carriers in the model and considering hub and non-hub operators.
- Finally, to understand the complexity of the scenarios and other parameters, efficiency factors are considered: passenger performance (missed connections), complexity (number of changes on the decisions), emissions and holding at the AMAN parameters.

For each performance indicator a set of aggregators have been computed (e.g., average value, count, percentile 90) and different restrictors applied (e.g., all flights, only charter flights, only full service carriers flights), leading to a total number of 381 indicators as shown in Appendix A.

| | Indicator | Units | Description |
|---|---|---|---|
| 4 | AO TYPE | - | Aircraft operator type (FSC, REG, LCC, CHT) |
| 12 | SOBT | datetime | Scheduled OF BLOCK time |
| 15 | INPUT_DELAY | min | Input delay using burr distribution, TD |
| 21 | WAIT_DELAY1 | min | Wait time selected to wait for connecting pax |
| 22 | EOBT | datetime | |
| 23 | OB DELAY | min | ETOT - SOBT |
| 24 | DMAN DELAY | min | Delay from departure airport |
| 25 | AOBT | datetime | |
| 31 | ATOT | datetime | |
| 32 | TOUT delay | min | ATOT - AOBT - TAXI OUT EST |
| 33 | IRCT | datetime | Initial reaching cruise time: SOBT + taxi_out_est + climb_dur |
| 37 | ARCT | datetime | |
| 38 | ARCT_ARR_DELAY | min | Arrival delay when reaching TOC |
| 39 | CLIMB DELAY | min | ARCT - ATOT - climb duration |
| 45 | CA0 | kmmin | Last proposed speed for outbound flights before flight leg start |
| 46 | CA1 | kmmin | Optimal airspeed for outbounds before EOBT |
| 47 | CA2 | kmmin | Optimal airspeed after ARCT |
| 51 | CRUISE_DIST_SPEEDUP | km | Cruise distance increment when speedup (more than nom speed) |
| 52 | CRUISE_DIST_UNCERT | km | Cruise distance uncertainty to add to cruise distance nominal |

| | Indicator | Units | Description |
|---|---|---|---|
| 58 | CFC2 | € | Variation of fuel cost using CA2 speed |
| 59 | FUEL CONS CFC2 | Kg | Variation of fuel consumption using CA2 speed |
| 62 | CNCC2 | € | Optimal non connecting pax costs (SC) using CA2 |
| 64 | CCHC2 | € | Optimal connecting pax hard costs using CA2 |
| 66 | CCSC2 | € | Optimal connecting pax soft costs using CA2 |
| 68 | CCNMC2 | € | Optimal crew and management costs using CA2 |
| 72 | CCT_NOM | min | Cruise duration using nominal speed |
| 74 | CCT2 | min | Optimal cruise time using CA2 (added uncertainty and speedup) |
| 75 | ACT | min | Actual cruise time |
| 78 | CIBT2 | datetime | Calculated In-Block time using CA2 speed |
| 83 | AMAN Delay | min | Aman delay |
| 85 | IAF delay | min | APTI - ARCT - cruise dur |
| 89 | ADT | min | Descent time duration at CA2 speed |
| 91 | TA delay | min | ATA - APTI - descent dur |
| 96 | TINT UNCERT | min | Taxi in uncertatinty to be added to TINT TACT |
| 97 | AIBT | datetime | |
| 98 | TIN DELAY | min | AIBT - ATA - TIN_EST |
| 100 | ARR DELAY FROM IIBT | min | AIBT - IIBT |
| 101 | ARR DELAY FROM SIBT | min | AIBT - SIBT |
| 103 | SDUR | min | SIBT - SOBT |
| 104 | ADUR | min | AIBT - AOBT |

Table 18 – Selection of indicators computed per flight per simulation

| Id | Indicator | Category | Sub-Category | Definition | Aggregations | Values |
|---|---|---|---|---|---|---|
| P5a | Flight departure delay | Delay | Flight performance | SOBT and AOBT per flight to calculate delay as AOBT-SOBT. | All flights<br>- Globally<br>- Airline type<br>Inbound/Outbound | AVG(min)<br>SD(min) |
| P5b | Flight arrival delay | Delay | Flight performance | SIBT and AIBT per flight to calculate delay as AIBT-SIBT | All flights<br>- Globally<br>- Airline type<br>Inbound/Outbound | AVG(min)<br>SD(min) |
| P13 | Pax delay | Delay | Passengers performance | Final flight SIBT and AIBT. (AIBT-SIBT) per passenger | All passengers<br>- Globally<br>Airline type | AVG(min)<br>SD(min) |

| Id | Indicator | Category | Sub-Category | Definition | Aggregations | Values |
|---|---|---|---|---|---|---|
| P15 | Departure delayed flights | Delay | Flight performance | | Flights with departure delay greater than 5 minutes<br>- Globally<br>Airline type | Count(flights)<br>AVG(min)<br>SD(min) |
| P17 | Arrival delayed flights | Delay | Flight performance | | Flights with arrival delay greater than 5 minutes<br>- Globally<br>Airline type | Count(flights)<br>AVG(min)<br>SD(min) |
| P26 | Delay recovered at cruise | Delay | Flight performance | Only for flights that speedup | For all flights that speedup, estimated at TOC<br>- Globally<br>- Airline type<br>For all flights that speedup, actual after AMAN<br>- Globally<br>- Airline type<br>For all flights that speedup, final delay recovered<br>- Globally<br>Airline type | AVG(min)<br>SD(min)<br>SUM(min) |
| P25 | Wait for passenger flights waiting | Delay | Flight performance | | All outbound flights that wait<br>- Globally<br>- Airline type | COUNT(flights waiting)<br>PERC(% flights waiting)<br>AVG(min)<br>SD(min)<br>SUM(min) |
| P25 | Wait for passenger flights all | Delay | Flight performance | | All outbound flights that wait and speedup at EOBT<br>- Globally<br>All outbound flights that wait and speedup at ARCT<br>Globally | COUNT(flights) |
| P27 | Waiting time in connections | Delay | Flight performance | (Outbound AOBT - Inbound AIBT) - (Outbound SOBT - Inbound SIBT) | For all connecting passengers<br>- Globally<br>Airline type | AVG(min)<br>SD(min)<br>SUM(min) |
| P1 | Gate-to-gate passenger trip time | Delay | Passengers performance | For each passenger, AIBT of final flight - AOBT of first flight | Globally and per airline type for:<br>• All passengers<br>• Connecting<br>Non-connecting | AVG(min)<br>SD(min)<br>PERC90(min)<br>PERC95(min) |
| P21 | Pax overnight stays | Delay | Passenger performance | Number of passengers that were no possible to re-accommodate | Connecting passengers with unknown outbound<br>Globally | Count(pax) |
| P20 | Arrival delayed passengers | Delay | Passenger performance | | Passengers with arrival delay greater than 5 minutes<br>Globally | Count(pax) |

| Id | Indicator | Category | Sub-Category | Definition | Aggregations | Values |
|---|---|---|---|---|---|---|
| P6 | Airlines cost all | Costs | | Total cost for the airlines | All airlines<br>- Globally<br>Airline type | AVG(eur)<br>SD(eur) |
| P7 | Airlines cost hub | Costs | | Total cost for the airlines | HUB airlines<br>Globally | AVG(eur)<br>SD(eur) |
| P9 | Airlines cost non-hub | Costs | | Total cost for the airlines | NON-HUB airline<br>Globally | AVG(eur)<br>SD(eur) |
| P22 | Extra fuel cost | Costs | | Extra cost due to extra-fuel consumption | All flights at cruise<br>- Globally<br>- Airline type<br>All flights after AMAN<br>- Globally<br>Airline type | AVG(eur)<br>SD(eur) |
| P23 | Flight passenger costs (to airline) | Costs | | Direct cost of passenger delay | All flights, all costs<br>- Globally<br>- airline type<br>All flights, primary costs only<br>- Globally<br>- Airline type<br>All flights, reactionary costs only<br>- Globally<br>Airline type | AVG(eur)<br>SD(eur) |
| P24 | Direct flight cost per minute of delay | Costs | | Direct flight cost (airline cost) divided between total arrival delay | All flights, all costs<br>- Globally<br>Airline type | RATE(eur) |
| P4 | Missed connections | Efficiency | Passengers performance | For each outbound flight, it takes the number of passengers from inbounds that miss the connection with that flight but are rescheduled to another flight. Outbounds for which all connections were made are not considered. | All outbound flights<br>- Globally<br>- Airline type | AVG(#pax rescheduled)<br>SD(#pax rescheduled)<br>SUM(#pax rescheduled) |
| P11 | Speed variations incurred | Efficiency | Complexity of the solution | Amount of speed changes per flight. | All flights<br>- Globally (not count, perc)<br>- Airline type (not count, perc)<br>For recovering delay flights<br>- Globally<br>- Airline type<br>- Airline type & Inbound/Outbound | COUNT(flights)<br>PERC(flights)<br>AVG(percent)<br>SD(percent) |

| Id | Indicator | Category | Sub-Category | Definition | Aggregations | Values |
|---|---|---|---|---|---|---|
| P14 | Emissions | Efficiency | Emissions | Amount of $CO_2$ per aircraft. | All flights<br>- Globally<br>- Airline type | AVG(tons CO2)<br>SD(tons CO2) |
| P19 | Holding | Efficiency | Flight performance | from expected landing when entering the AMAN until actual landing time | All flights, also outbounds (holding = 0)<br>- Globally<br>- Airline type | AVG(min)<br>SD(min) |

Table 19 – Performance indicators computed per simulation

| Category | Sub-Category | Metric |
|---|---|---|
| Delay | Flight performance | • P5a - Flight departure delay<br>• P5b - Flight arrival delay<br>• P13 - Pax delay<br>• P15 - Departure delayed flights<br>• P17 - Arrival delayed flights<br>• P26 - Delay recovered at cruise<br>• P25 - Wait for passenger flights waiting<br>• P25 - Wait for passenger flights all<br>• P27 - Waiting time in connections |
| | Passengers performance | • P1 - Gate-to-gate passenger trip time<br>• P21 - Pax overnight stays<br>• P20 - Arrival delayed passengers |
| Costs | | • P6 - Airlines cost all<br>• P7 - Airlines cost hub<br>• P9 - Airlines cost non-hub<br>• P22 - Extra fuel cost<br>• P23 - Flight passenger costs (to airline)<br>• P24 - Direct flight cost per minute of delay |
| Efficiency | Passengers performance | • P4 - Missed connections |
| | Complexity of the solution | • P11 - Speed variations incurred |
| | Emissions | • P14 - Emissions |
| | Flight performance | • P19 - Holding |

Table 20 – Performance indicators by category

# 7 Results

As explained in section 2.3.1 and, in detail, in SESAR (2014), fuel consumption has been estimated as a function of the flight characteristics, including the flight plan distance, for most of the flights based on BADA 4.0. This means that for each aircraft type there are a set of fuel consumption functions that vary as a function of the flight plan distance. When implementing the SESAR improvement, the total flight plan distance is reduced which means that in a few cases a different fuel consumption function could be used for the flight. However, in the implementation of the model, the nominal and envelope speeds have not been modified in the fuel consumption computations. This has led that in some specific flights the extra fuel consumption estimated when applying DCI has been underestimated. This effect is limited to a reduced set of flights in the SESAR improved scenarios and does not impact the overall conclusions: 1.8% of the flights operating outside their performance envelope (12 flights) and a further 19.8% with a nominal speed that is not the one they should have (134 flights) but just 5.0% of the total amount of flights have a difference greater than 5% that what they should have (34 flights).

The numeric values used for quantifying the hypothesis are collected in Appendix B. The normality tests of the different parameters obtained from the simulations are presented in Appendix C. Appendix D contains all the 95% Confidence Interval for the different scenarios and for all the metrics described in section 6 and Appendix A. The statistical difference of the different scenarios analysed is summarised in Appendix E. Finally, the results for all the parameters and all the scenarios are presented in Appendix F.

***In the analysis the scenarios have been number based on the selections of flight database, strategy applied, fuel costs and delay as described in Table 13 being each digit the option selected for each of the scenario variables. For example, 1112 represents the first flight database, the first strategy, the first fuel cost and the second initial delay: 2010 traffic, strategy 1 (standard operations), nominal fuel and medium delay.***

## 7.1 Hypothesis analysis

Several qualitative hypotheses are pre-defined and data from the simulation will be used to test the hypothesis about their validity. The results of the simulations will as well provide quantitative information about the hypothesis that can only be defined qualitatively a priori. The validity or falsifiability of the hypothesis will provide us an insight on the model and its results.

The hypotheses have been classified in the three categories defined in Table 20: delay, costs and efficiency.

- **Delay:**
  - *HD1*: Flight databases: Ground and SESAR improvements should reduce overall gate-to-gate time for connecting passengers. However, keeping everything else equal, there is a higher risk for passengers missing connections, or an increase in wait-for-pax time.
  - *HD2*: Fuel costs: An increase in fuel cost is expected to decrease average cruise airspeed, increasing slightly the passenger delay, and overall gate-to-gate time.
  - *HD3*: Strategies: The impact of cost optimisation strategy on delay, is unknown a priori. It is expected to reduce delay on operators with connecting passengers, while it may increase the delay on operators without connecting passengers.
  - *HD4*: Strategies: Higher claims on passenger compensation (strategy 3) might lead to fewer connections missed and a reduced gate-to-gate time.
  - *HD5*: Flight databases: SESAR improvements will reduce total cruise distance and the possibility of recover delay with speed variation strategies.
- **Costs:**

- *HC1*: Flight databases: More restrictive schedules (i.e., ground improvements) will increase the operations costs, since there is a higher risk for delay.
- *HC2*: Fuel costs: Higher fuel cost will increase overall operation costs. Aircraft will tend to fly slower to reduce fuel cost, but delay cost will increase.
- *HC3*: Strategy: Optimisation strategy (2) should reduce costs by a small percentage. The margin of improvement is, however, unknown. An increase in the number of passengers claiming delay compensation (3) should increase the airlines costs.
- *HC4*: Delay: The delay input will impact the operational costs directly. Higher delays in the system will lead to higher costs.

- **Efficiency:**
  - *HE1*: Fuel: An increment in fuel cost will lead to lower emissions.
  - *HE2*: Strategy: Emissions might increase with strategy (2) and (3) as DCI is allowed and higher fuel consumption might be expected.
  - *HE3*: Holding time: It is expected to increase when the delay is high.

### 7.1.1 Delay hypothesis 1

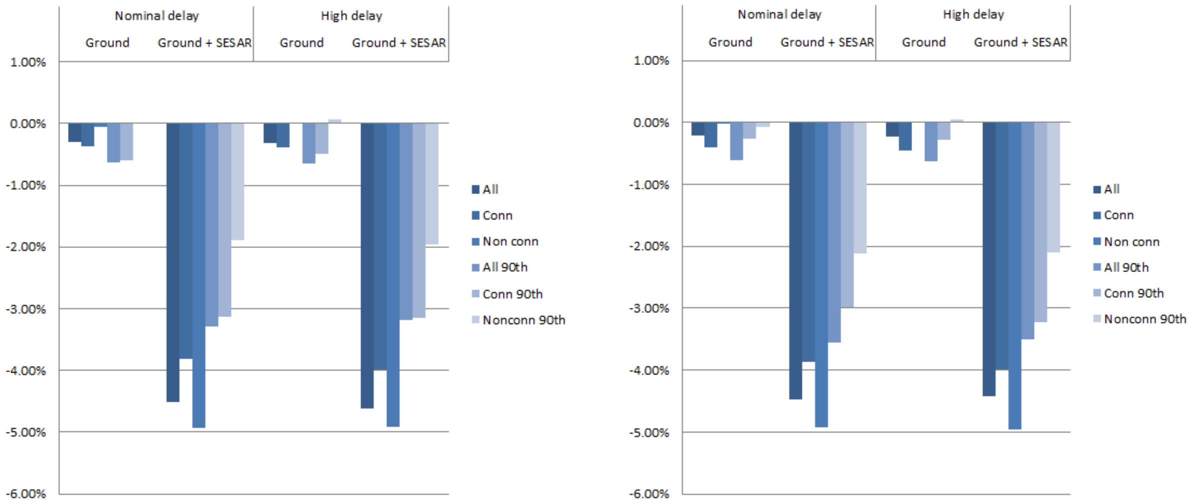
**Statement**

HD1*:* Flight databases: Ground and SESAR improvements should reduce overall gate-to-gate time for connecting passengers. However, keeping everything else equal, there is a higher risk for passengers missing connections, or an increase in wait-for-pax time.

**Hypothesis analysis:**

a. *Applying the ground and SESAR improvements should reduce overall gate-to-gate time for connecting passengers.*

Figure 34 presents the average improvement observed of the gate-to-gate times with respect to 2010 traffic when ground and ground and SESAR improvements are implemented for medium and high delay scenarios:




(a) Standard operations (b) Optimized operations

Figure 34- Average gate-to-gate time reduction

The average gate-to-gate time for passengers improves marginally when ground improvements are implemented (an average reduction of 0.3% with respect to 2010 traffic trajectories). When adding SESAR improvements, the average gate-to-gate time is reduced in average 4.5% as routes are shortened. This reduction is in average around 10 minutes, which is slightly higher than the 8 minutes expected from the shortening of the routes as shown in section 5.4.3.

For the 90th percentile the reduction is greater when ground improvements are implemented (0.6%) and the reduction of the gate-to-gate trip time thanks to the SESAR improvements is lower (around 3% instead of 4.5% in average). These reductions are independent to the delay (normal or high) and to the strategy of optimisation (standard operations or optimised operations).

SESAR improvements generate a higher benefit for non-connecting passengers than for connecting passengers. This is expected as non-connecting passengers do not benefit by shorter turn-around and connections at the airport obtained with the ground improvements.

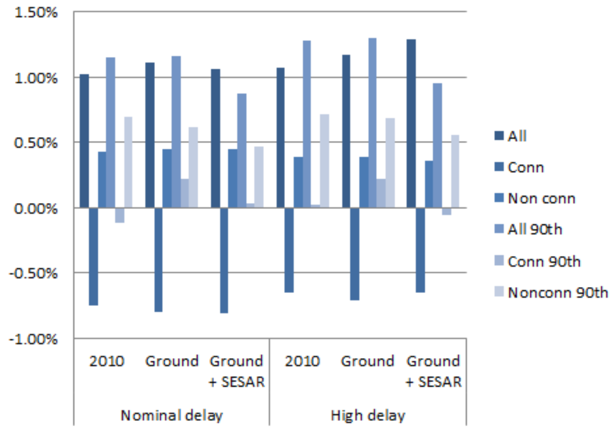



**Figure 35- Average gate-to-gate change with optimised strategy**

The comparison between the non-optimised scenarios and the optimised operations show that in average the gate-to-gate time increases in around 1.1% for all the scenarios (see Figure 35). Hence, applying the optimisation strategy adds duration to the gate-to-gate time experience by passengers instead of reducing it. For non-connecting passengers the gate-to-gate trip increases by 0.4% in average, while connecting passengers decrease their gate-to-gate time in 0.8% for medium delay and 0.6% for high delay. Results show that the optimisation is trading delay of non-connecting passengers for connecting passengers' delay. The higher delays (90th) for connecting passengers remains similar while for non-connecting passengers increases by 0.7%.

*b. Keeping everything else equal, there is a higher risk for passengers missing connections, or an increase in wait-for-pax time.*

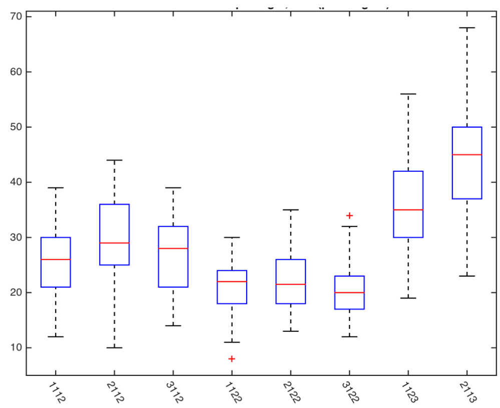
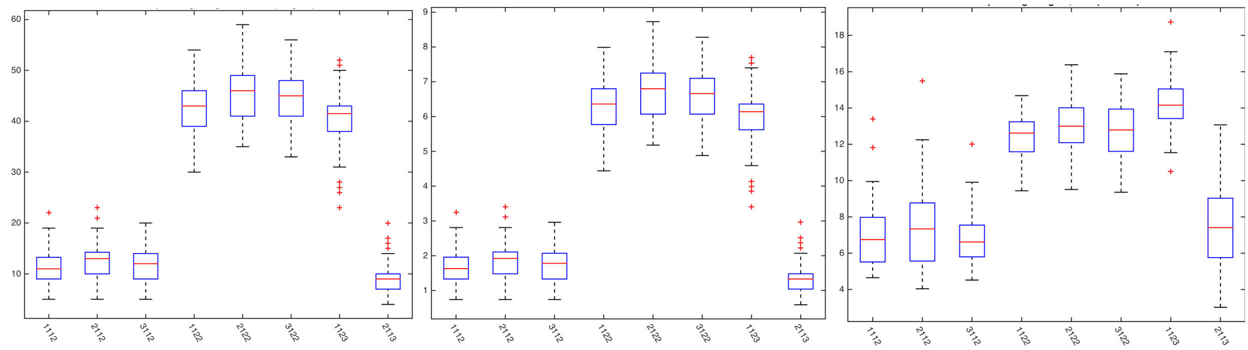



**Figure 36- Number of passengers missed connections**

The number of passengers missing connections is independent of the traffic optimisation (ground or ground and SESAR traffic); it is mainly dependent on the delay in the system (medium or high). It is also observed that when the optimisation is implemented there is a reduction on the number of passengers missing their connection (see Figure 36). This reduction ranges in average from around 14.4% for high delay and 2010 traffic to 24.7% for medium delay and ground improvements implemented.




(a) Number of flights (b) Percentage of flights (%) (c) Average waiting time (min)

**Figure 37- Wait for passengers**

Finally, if focus is given to the wait for passenger strategy, the number of flights waiting for connections in general increases marginally when ground or ground and SESAR improvements are implemented but not in a relevant manner (see Figure 37). It seems that slightly less flights wait and for less time in the SESAR and ground improved scenario with respect to the only ground improved one. The main difference, however, is when the optimisation is implemented. In that case, the number of flights waiting for passengers increase notoriously: an average of 270% for the medium delay scenarios and around 350% for the high delay scenarios (increasing from around 1.7% of outbound flights waiting for passengers to 6.5%). Not only the number of flights waiting increases but also the average waiting time around 78% for medium delay scenario and 93% for high delay scenarios (from 7 minutes of waiting-for-passengers in the non-optimised operation to 13 and 14 minutes in average for the optimised operations in medium and high delay scenarios respectively).

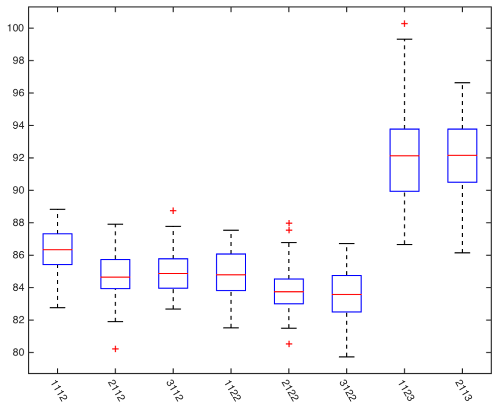



**Figure 38- Average waiting time in connections (min)**

Figure 38 presents the average waiting time in connection at the hub and it can be observed that this time, in average, decreases when ground improvements are implemented (in average 1.8%). The optimisation of the operations generates a further reduction of around 1.6%.

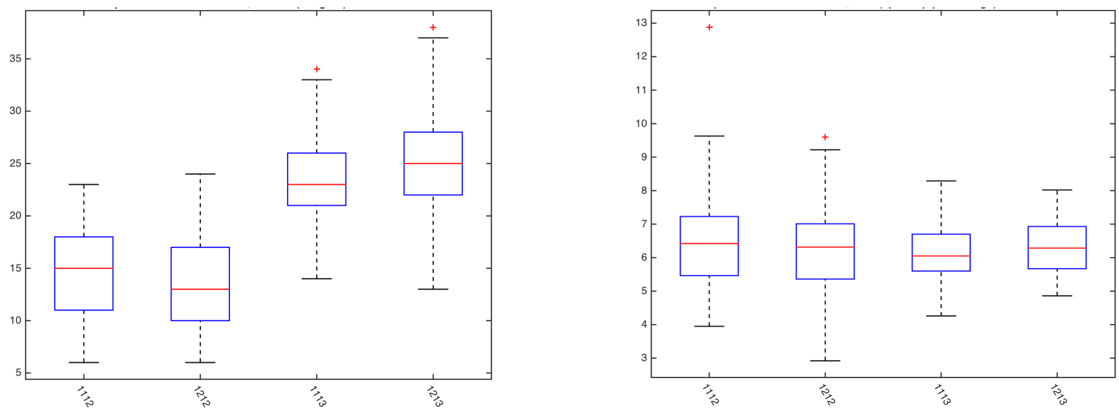
### 7.1.2 Delay hypothesis 2

**Statement**

HD2*:* Fuel costs: An increase in fuel cost is expected to decrease average cruise airspeed, increasing slightly the passenger delay, and overall gate-to-gate time.

**Hypothesis analysis:**

*a. 2010 traffic with standard operations (non-optimised):*




(a) Number of flights

(b) Average speed variation (%)

**Figure 39- Speed variations for standard operation, nominal and high fuel, medium and high delay**

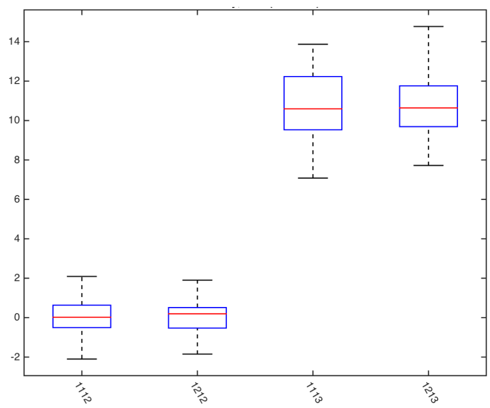
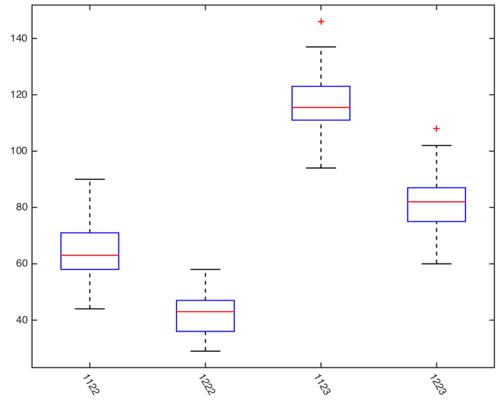


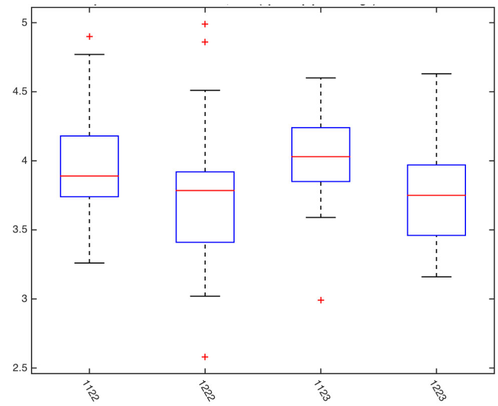

**Figure 40- Passenger delay for standard operations, nominal and high fuel, medium and high delay (min)**

In strategy 1, the speed variation is decided just as a percentage of the flights delayed. Therefore, the cost of fuel does not play a role. For this reason, as expected, the speed variations and gate-to-gate time overlap among them if fuel price is varied (see Figure 39). The delay experienced by passengers is related to the delay in the system not to the cost of fuel (see Figure 40).

*b. 2010 traffic with optimised operations:*




(a) Number of flights

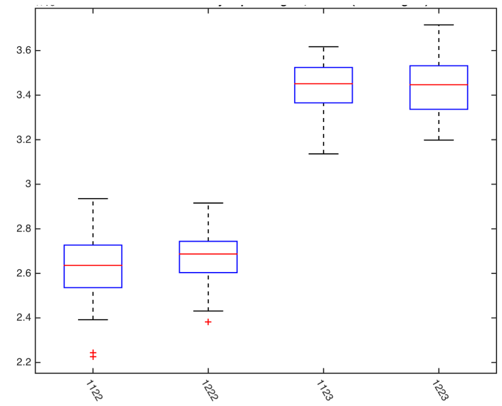



(b) Average speed variation (%)

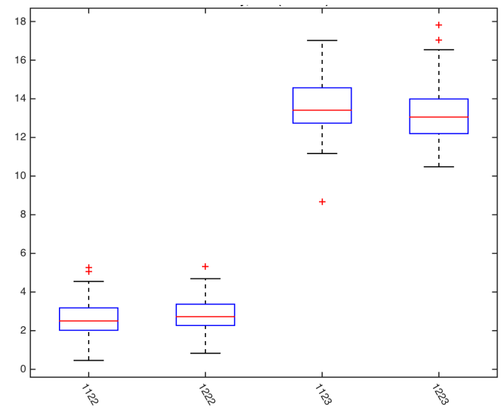
**Figure 41- Speed variations for optimised operation, nominal and high fuel, medium and high delay**

As shown in Figure 41, fuel price has an impact on the number of flights speeding up (in medium delay situation the increase in fuel price leads to a reduction of 34.7% of the number of flights doing speed adjustments, in high delay scenarios, the decrease due to fuel increment is around 30.8%). The variation of speed selected is smaller but with an overlap of possible values (on average there is a reduction of the variation of speed of 5.3% for the medium delay and of 7.5% for the high delay).

Note also that even if in the optimised operations, Figure 42, there are more flights increasing the speed with respect to the non-optimised strategy (an increment in the medium delay of around 350% and in the high delay of around 220%), the speed selected are smaller than in the non-optimised strategy (the average increment in speed is around 6.3% for the non-optimised strategy and around 3.8% for the optimised one). This will be related to the fact that in the optimised strategy the overall cost is optimised considering also the cost of fuel.




(a) Number of passengers arriving delayed

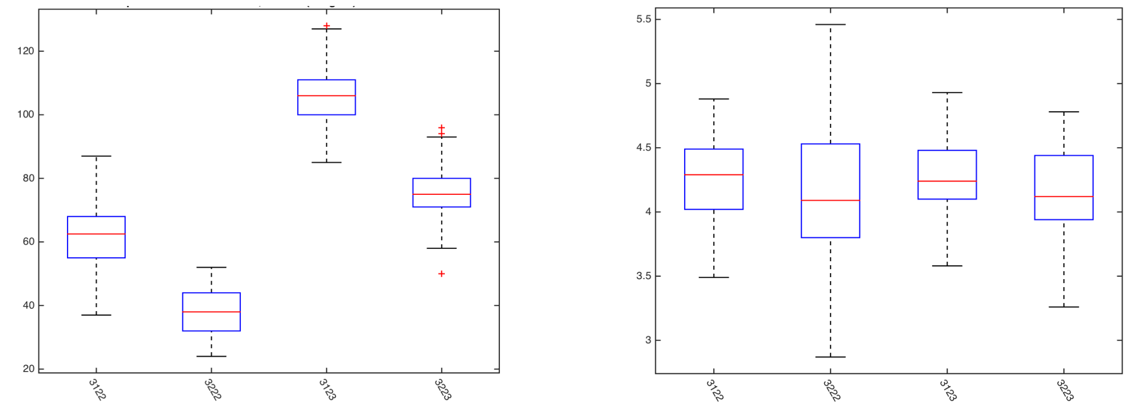



(b) Average delay per passenger (min)

**Figure 42- Passenger delay for optimised operation, nominal and high fuel, medium and high delay**

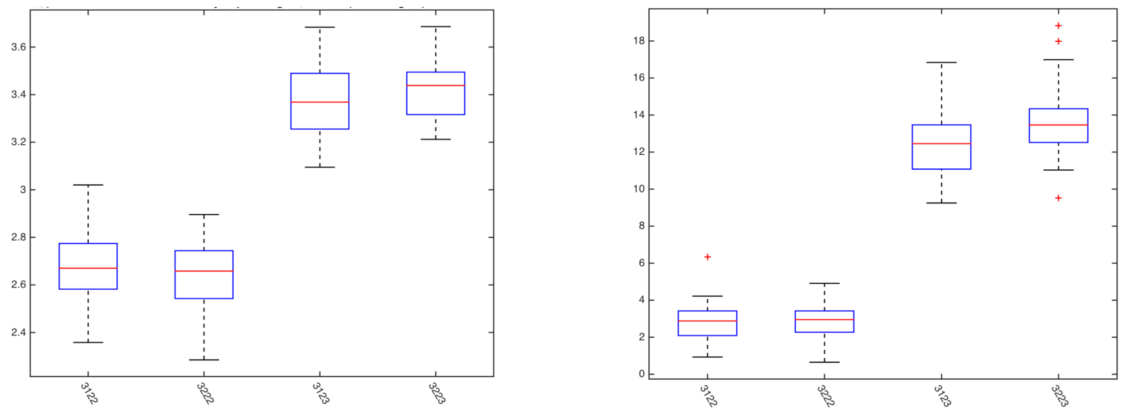
Finally, fuel costs do not seem to have an impact on passenger metrics.

*c. Ground and SESAR improvements with optimised operations:*




**(a) Number of flights** **(b) Average speed variation (%)**

**Figure 43- Speed variations for optimised operation SESAR and ground improvement, nominal and high fuel, medium and high delay**




**(a) Number of passengers arriving delayed** **(b) Average delay per passenger (min)**

**Figure 44- Passenger delay for optimised operation SESAR and ground improvement, nominal and high fuel, medium and high delay**

As in 2010 traffic, fuel seems to affect the number of flights doing speed variation but not the magnitude of the variations (see Figure 44Figure 43), but higher fuel costs seems not to have a relevant impact on the gate-to-gate metrics. On the other hand, the reduced flight plan distances lead to an increment on the average speed increase of around (from 3.8% to 4.2% of speed increment) (see Figure 43).

### 7.1.3 Delay hypothesis 3

**Statement**

HD3: Strategies: The impact of cost optimisation strategy on delay is unknown a priori. It is expected to reduce delay on operators with connecting passengers, while it may increase the delay on operators without connecting passengers.

**Hypothesis analysis:**

*a. 2010 traffic:*

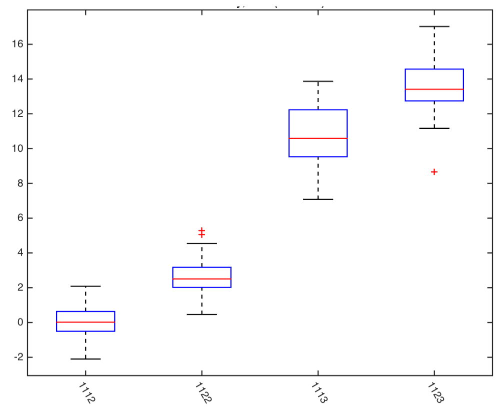



**Figure 45- Passenger delay for nominal fuel standard and optimised operations, medium and high delay (min)**

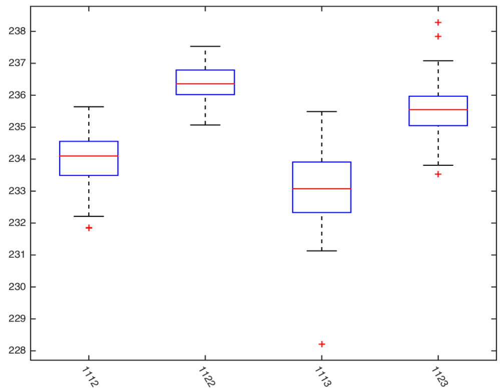
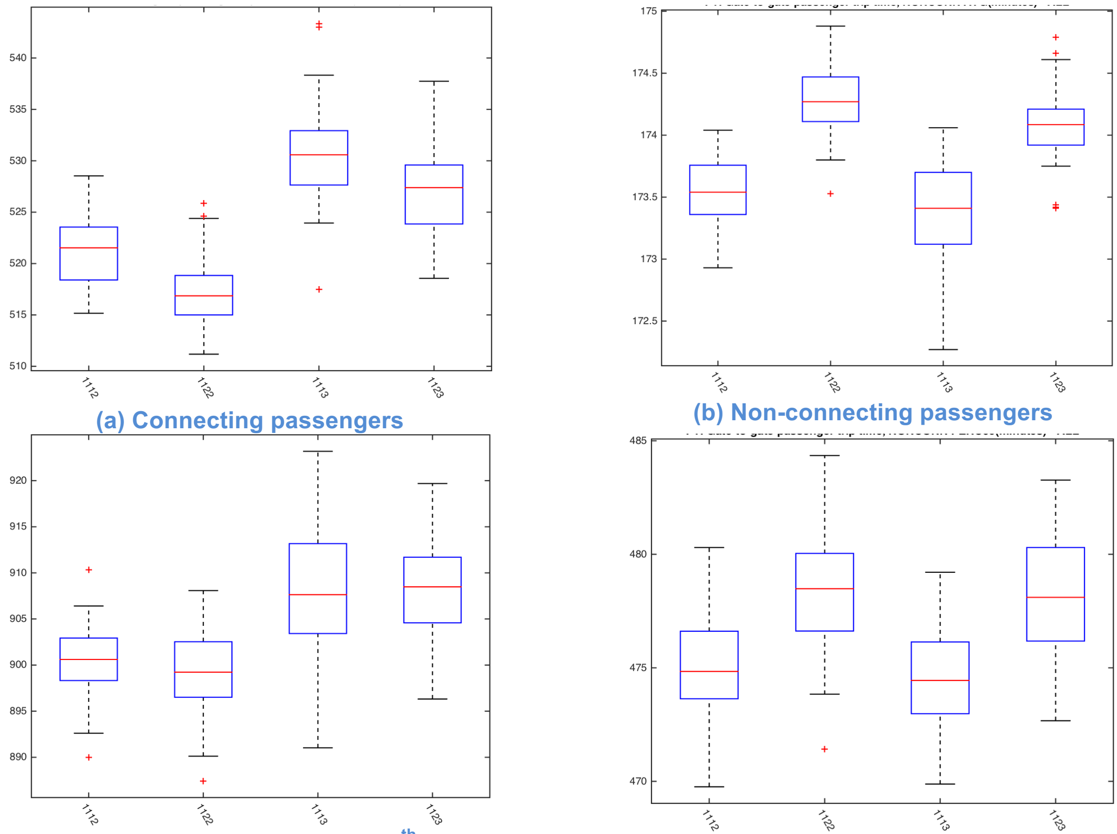



**Figure 46- Passenger gate-to-gate time (min) for nominal fuel standard and optimised operations, medium and high delay**

As presented in Figure 45 and in Figure 46, in general, there is an increment on the passenger delays and gate-to-gate time when an optimised strategy is applied (around 1.1% of gate-to-gate time increment with respect to current operations).




(a) Connecting passengers

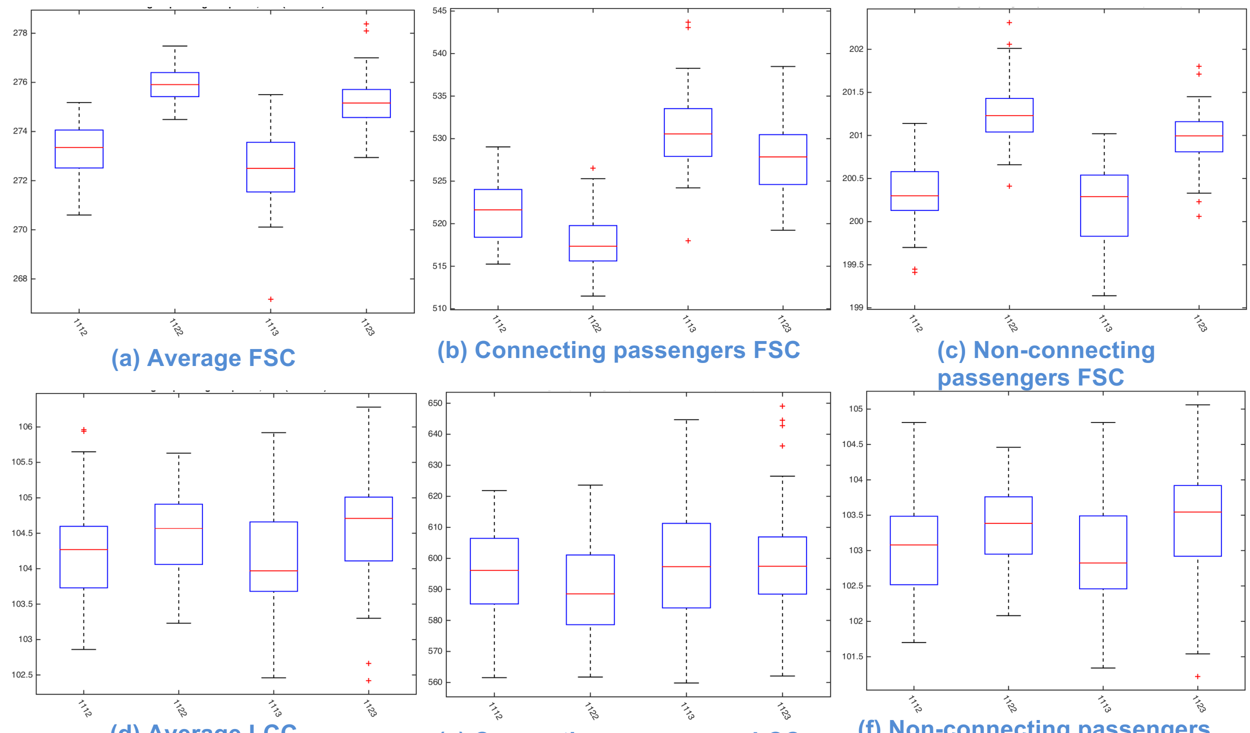
(b) Non-connecting passengers

(c) Connecting passengers (90th percentile)

(d) Non-connecting passengers (90th percentile)

**Figure 47- Passenger gate-to-gate time (min) for connecting and non-connecting passengers in nominal fuel standard and optimised operations, medium and high delay**

When differencing between connecting and non-connecting passengers, it can be observed that there is an improvement on the gate-to-gate time experienced by connecting passengers (reduction of gate-to-gate time of around 0.8%) and a worsening of non-connecting passengers (increment of gate-to-gate-time of around 0.4%) (See Figure 47(a), (b)). Focus is given to the 90th percentile of gate-to-gate time; simulations show that there are no differences between non-optimised or optimised strategy for connecting passengers but a slight increment for non-connecting itineraries (0.7%) (See Figure 47(c), (d)). It seems that there is a trade-off between the delay experienced by passengers, this might be linked with the higher cost that airlines experienced when connecting passengers are delayed (i.e., higher compensations and missed connections). Note that these differences are in average but that there is a high overlap on possible values for the different simulations.




(a) Average FSC
(b) Connecting passengers FSC
(c) Non-connecting passengers FSC
(d) Average LCC
(e) Connecting passengers LCC
(f) Non-connecting passengers LCC

**Figure 48- Passenger gate-to-gate time (min) for airline type passengers in nominal fuel standard and optimised operations, medium and high delay**

Figure 48 present the results disaggregated by airline operator type (FSC and LCC). The average 1% of gate-to-gate increment is also observed if only FSC operations are selected, with an improvement of 0.6% for connecting passengers and a worsening of the gate-to-gate trip of 0.4% for non-connecting passengers. However, for LCC there is an overlap on the results observed. This is related to the fact that low cost carriers operators do not have many connecting passengers.

*b. Ground and SESAR improved traffic:*

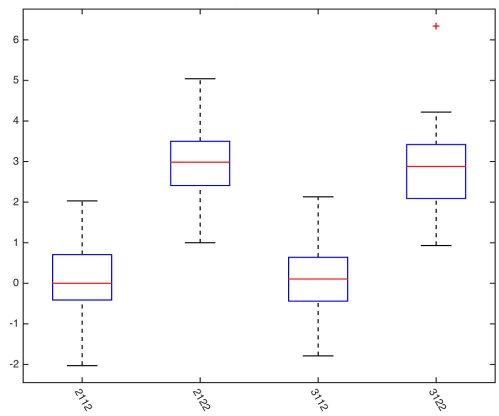
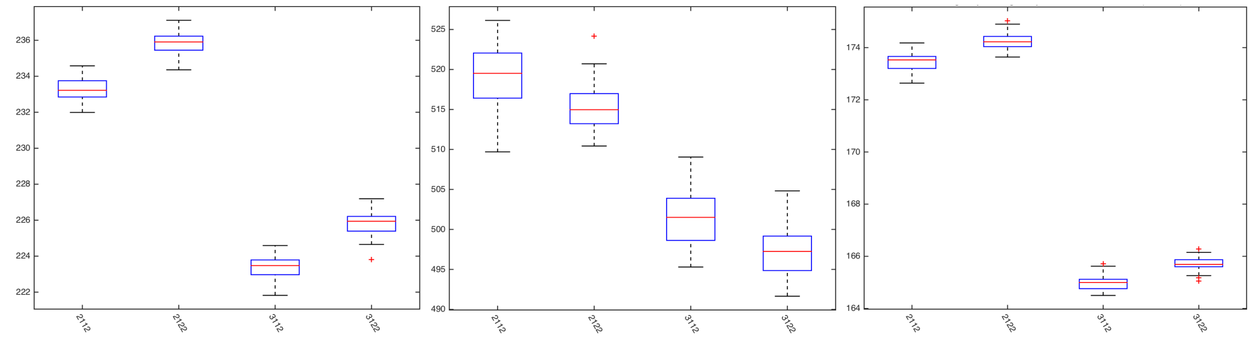



**Figure 49- Passenger delay (min) for nominal fuel, SESAR and ground improvements, standard and optimised operations, medium and high delay**



(a) Average (b) Connecting passengers (c) Non-connecting passengers

Figure 50- Passenger gate-to-gate time (min) for connecting and non-connecting passengers for SESAR and ground improvements with nominal fuel standard and optimised operations, medium and high delay

When applying the optimisation strategy on the Ground and Ground and SESAR scenarios with respect to non-optimised operations, the same effect on passenger delay and gate-to-gate trip times are similar than with 2010 traffic: increase passengers delay and passenger trip time for non-connecting passengers while slightly improving the trip time for connecting passengers (gate-to-gate time increases around 1% for all the passengers, decreases around 0.8% for connecting passenger and increases by 0.4% for non-connecting passengers) (see Figure 49). The higher delays 90 Percentile gate-to-gate times worsen by around 0.4% for connecting passengers and by 0.6% for non-connecting passengers (see Figure 50). Once again, this effect is clear for airlines with high number of connections (full service carrier) but non-existent on airlines without connecting passengers (low cost carriers).

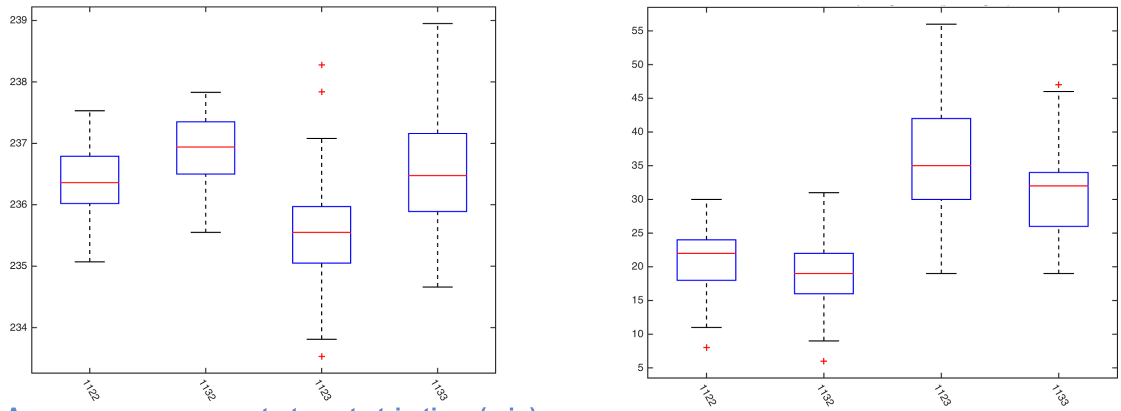
### 7.1.4 Delay hypothesis 4

**Statement**

HD4: Strategies: Higher claims on passenger compensation (strategy 3) might lead to fewer connections missed and a reduced gate-to-gate time.

**Hypothesis analysis:**

*a. 2010 traffic:*

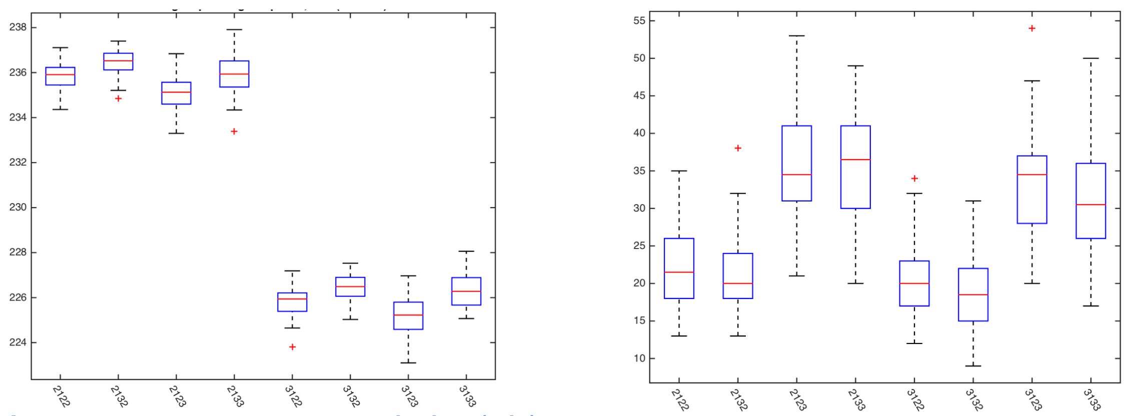



(a) Average passenger gate-to-gate trip time (min) (b) Number of missed connections

**Figure 51- Passenger gate-to-gate trip and missed connections 2010 traffic, optimised operation and optimised operation with higher compensation claim, nominal fuel and medium and high delay**

For 2010 dataset, there is a slight difference between strategy 2 and 3 in terms of passengers missing connections or passenger trip times as shown in Figure 51: with Strategy 3 there is an average worsening of 0.2% for medium delay scenarios and 0.4% for high delay scenarios, but as appreciated in the figure the results overlap between the different options. The number of missed connections is mainly dependent on the delay in the system. If the number of passengers claiming compensation increases, there is an average reduction of missed connections (8.5% in the medium delay scenario and nearly 15% for the high delay scenario), but as shown in the figure, there is still an overlap of possible values. Note that compensations are starting to be paid for delays greater than 180 minutes and that in general the delay experience by passengers is low.

*b. Ground and Ground and SESAR improvements:*




(a) Average passenger gate-to-gate trip time (min) (b) Number of missed connections

**Figure 52- Passenger gate-to-gate trip and missed connections with ground improvement and SESAR and ground improvements, optimised operation and optimised operation with higher compensation claim, nominal fuel and medium and high delay**

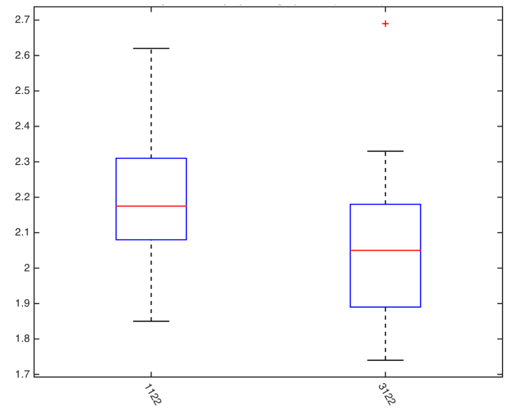
For Ground and SESAR with ground enhancement datasets, the differences in terms of passengers' trip times are independent to the increment on passenger compensation claims as shown in Figure 52. The number of passenger missing connections is slightly reduced but with certain overlap of possible values (in average a reduction between 0.6% (for the scenario with ground improvement and high delay) and 8.7% (for the scenario of SESAR + ground improvements and medium delay) of passengers missing their connection).

### 7.1.5 Delay hypothesis 5

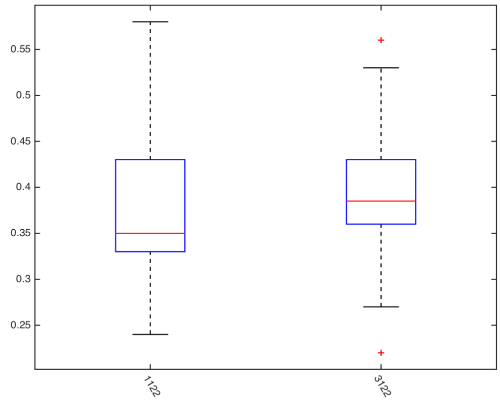
**Statement**

HD5: Flight databases: SESAR improvements will reduce total cruise distance and the possibility of recover delay with speed variation strategies.

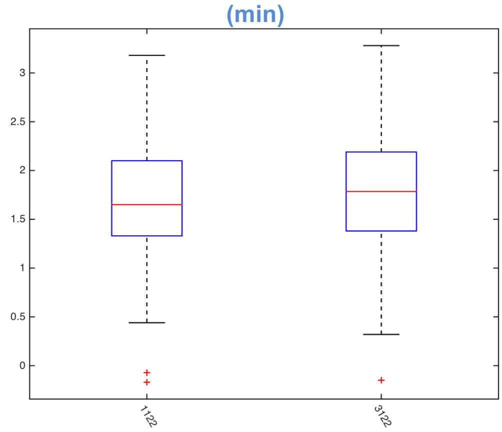
**Hypothesis analysis:**



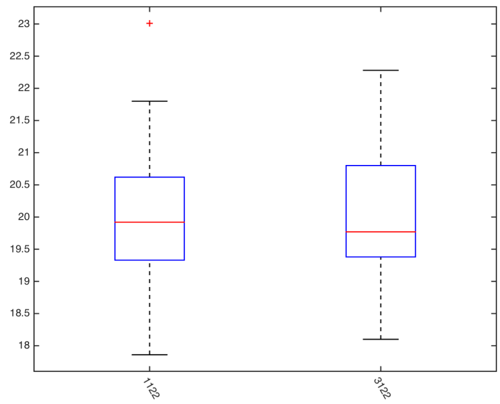

(a) Estimated average delay recovered at TOC (min)




(b) Average speed variation (%)




(c) Actual average delay recovered after AMAN (min)




(d) Average delay at arrival for flights arriving with more than 5 min of delay

Figure 53- Delay recovered estimated and actual, speed variation and arrival delay for flights in 2010 and SESAR and ground improved traffic with nominal fuel costs and delay

There is a lower estimation of the delay that can be recovered by speeding up at the top of climb in the SESAR improved scenarios (in average 7% lower than in the 2010 traffic), see Figure 53(a). Even if there is a overlap on the values observed in the simulations, in general, the shorter cruises lead to slightly higher speed selected (in average 3% higher), Figure 53(b). Thus, higher speeds are selected but less delay is expected to be recovered. However, this difference in potential delay recovered is absorbed by the system as shown in the arrival delay experienced, Figure 53(d) where there is no difference between the two scenarios; the total arrival delay is similar in both scenarios.

### 7.1.6 Cost hypothesis 1

**Statement**

HC1: Flight databases: More restrictive schedules (i.e., ground improvements) will increase the operations costs, since there is a higher risk for delay.

**Hypothesis analysis:**

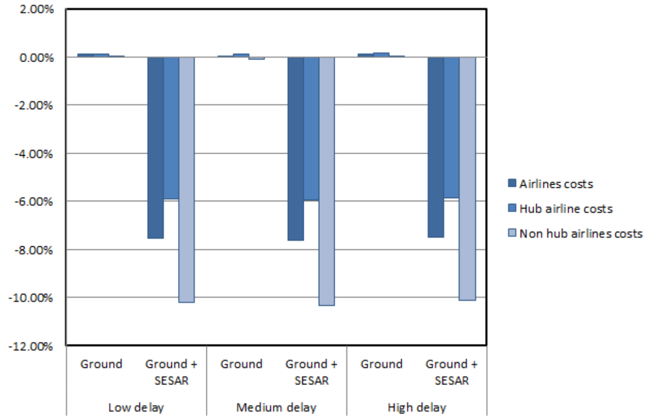
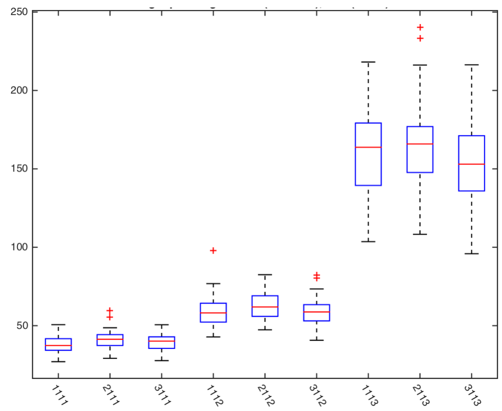
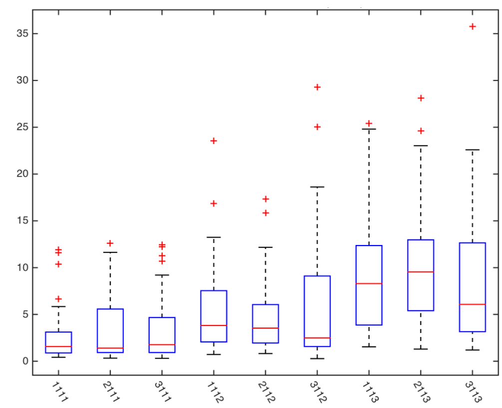



Figure 54- Average changes in airline costs using standard operations with ground and SESAR and ground improvements with respect to 2010 traffic

Figure 54 shows the average changes in airline costs by using ground and SESAR and ground improvements. While ground improvements have irrelevant impact on costs, SESAR improvements will impact greatly the airline costs (6% for hub airlines and 10% for non-hub airlines), most probably due to the reduction of flight distance when applying direct routes.



(a) Average costs (€) per flight due to passenger costs



(b) Average extra fuel cost (€)

Figure 55- Passenger and fuel costs for 2010, ground and SESAR and ground improvements for three strategies

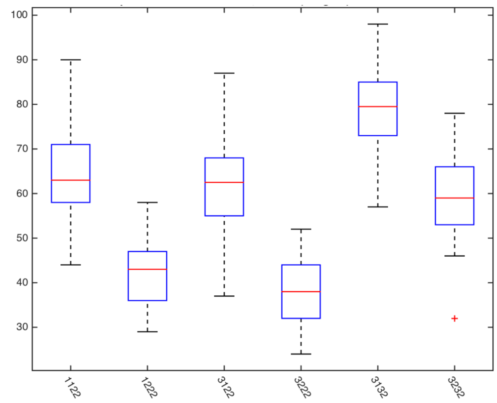
As shown in Figure 55, there is almost no difference on the costs due to the extra fuel used during the cruise by modifying the nominal speed as a function of the improvements in ground or ground and SESAR. Similarly, there is no difference in the costs experienced due to the passengers. Therefore, the improvement observed in costs is due to the shortening of the routes implemented with the SESAR improvements.

### 7.1.7 Cost hypothesis 2

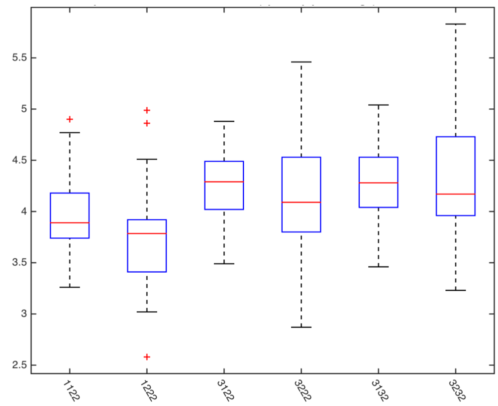
**Statement**

HC2: Fuel costs: Higher fuel cost will increase overall operation costs. Aircraft will tend to fly slower to reduce fuel cost, but delay cost will increase.

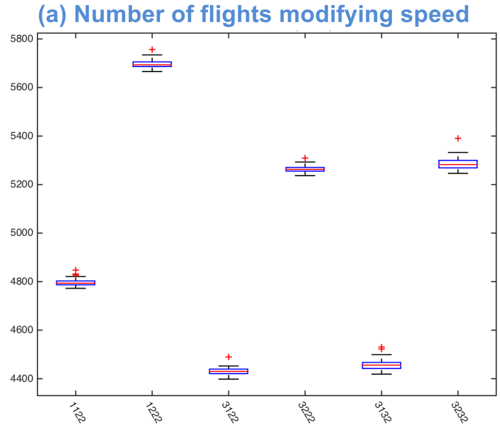
**Hypothesis analysis:**



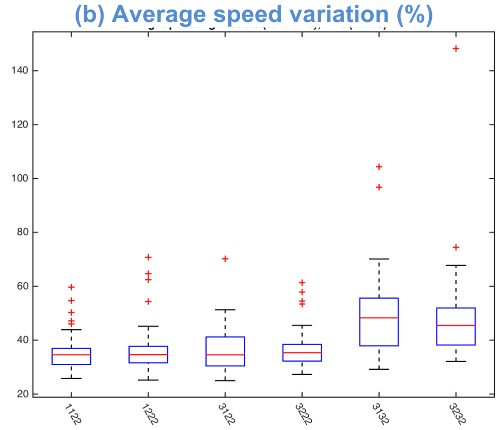

(a) Number of flights modifying speed



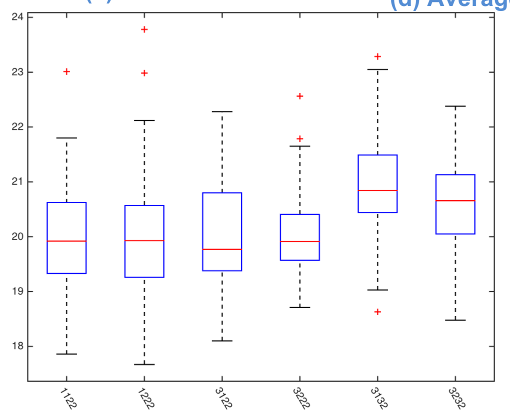

(b) Average speed variation (%)




(c) Average cost per airline (€)




(d) Average passenger cost (€)




(e) Number of flights arriving with more than 5 minutes delay

Figure 56- Speed variations, delay, cost and passenger costs for 2010 and SESAR and ground improved traffic with optimised operation with medium delay and nominal and high fuel

When there is an increment in the fuel cost from nominal to high, the number of flights doing speed adjustments decreases (in average 34.7% in 2010 traffic, 39.2% in SESAR and ground improvement scenario and 25.1% in the SESAR and ground scenario with higher passenger complains) (see Figure

56(a)). The percentage of speed variation is also lower, however, as shown in the SESAR and ground improvement scenarios, there is a higher variability on the speed selected (see Figure 56(b)).

An increment in the fuel cost from nominal to higher leads to higher costs for the airlines (an average increment of 18.7% for 2010 and SESAR and Ground improvement traffic) (see Figure 56(c)). On the other hand, the arrival delay is similar for scenarios with nominal and high fuel costs and the passengers' costs do not seem to be affected by the fuel costs (see Figure 56(c)-(e)).

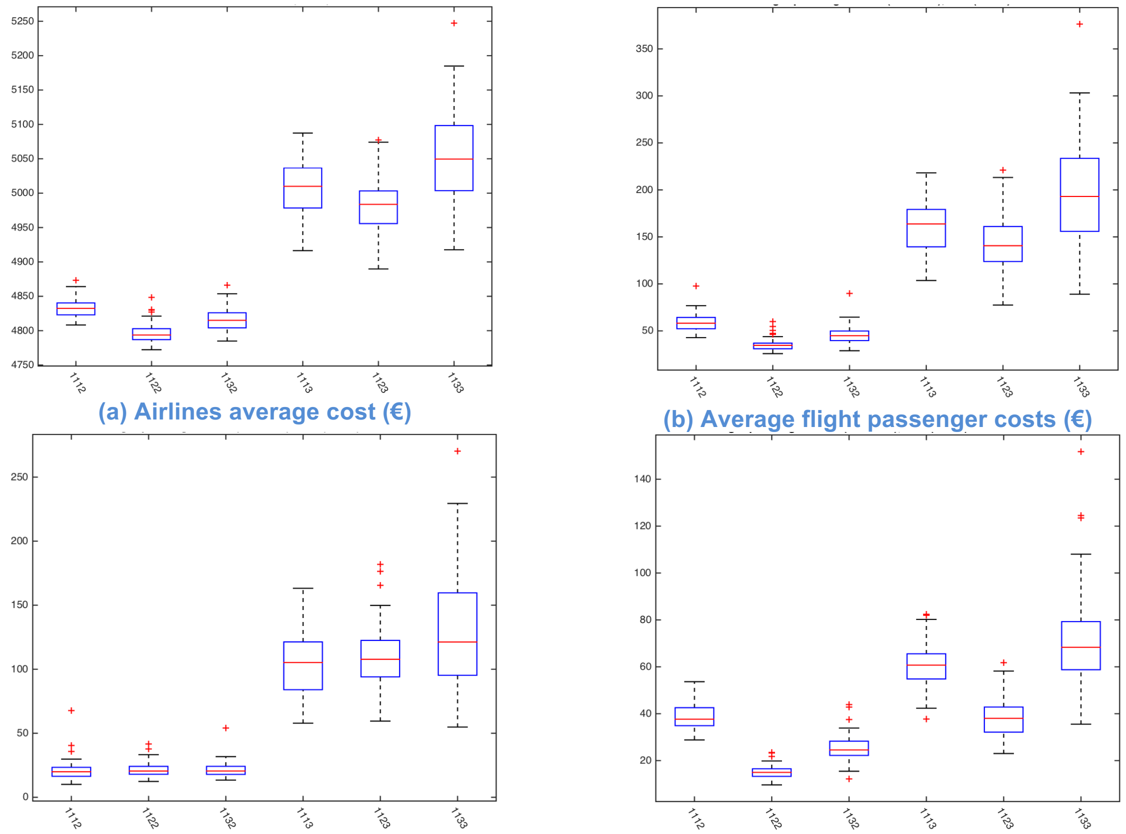
## 7.1.8 Cost hypothesis 3

**Statement**

HC3: Strategy: Optimisation strategy (2) should reduce costs by a small percentage. The margin of improvement is, however, unknown. An increase in the number of passengers claiming delay compensation (3) should increase the airlines costs.

**Hypothesis analysis:**

*a. Optimisation strategy (2) should reduce costs by a small percentage. The margin of improvement is, however, unknown.*




(a) Airlines average cost (€)

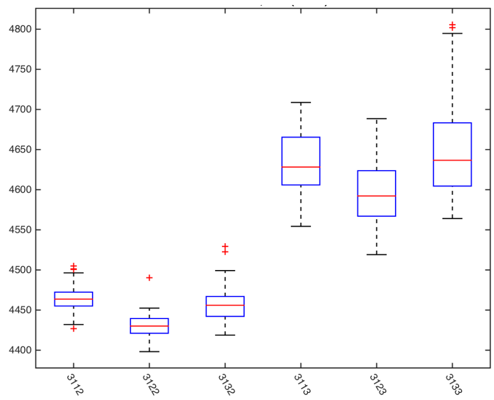
(b) Average flight passenger costs (€)

(c) Average primary passenger costs (€)

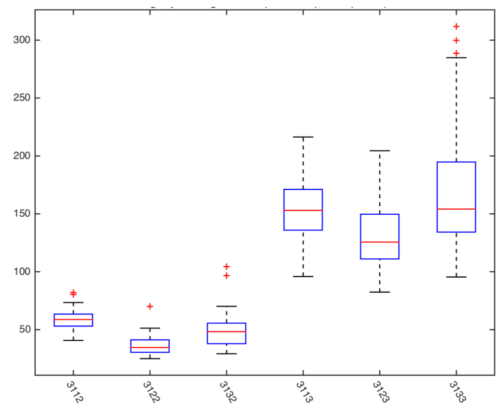
(d) Average reactionary passenger costs (€)

**Figure 57- Airline and passenger costs for 2010 traffic with optimised strategy and increased passenger claims, nominal fuel and medium and high delay**

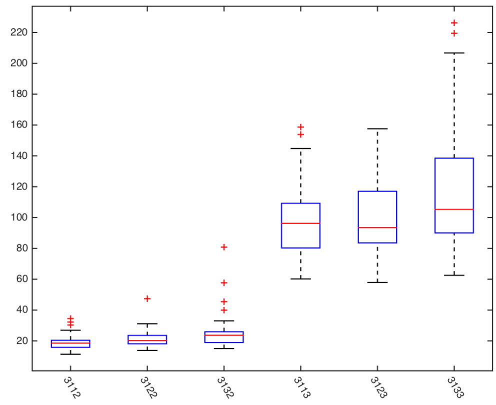
The simulation output, Figure 57, shows that there is an improvement on the total cost for the airlines when an optimisation is done with respect to current operational strategies. This improvement is, however, small. With 2010 traffic and medium delays, the average cost reduction is 0.7%, for high delay the improvement decreases to 0.5% and as shown in the figure, the variability of cost increases with higher delays.



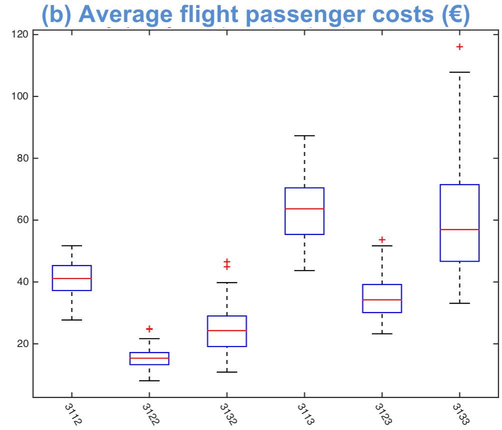

(a) Airlines average cost (€)




(b) Average flight passenger costs (€)




(c) Average primary passenger costs (€)




(d) Average reactionary passenger costs (€)

**Figure 58- Airline and passenger costs for 2010 traffic with optimised strategy and increased passenger claims, nominal fuel and medium and high delay**

If focus is given to the passengers' costs for airlines, Figure 58, it can be observed an improvement in the cost for the airlines (a reduction of nearly 40% for the costs in medium delay and of 10% for high delay scenario). Note that there is a minimal variation on the cost of the passengers due to primary delay but there is a noteworhty enhancement on the reduction of cost due to passengers and reactionary delay (higher than 60% for the medium delay scenario and 36% for the high delay scenario). This shows that the benefit in terms of cost is highly achieved by reducing the cost due to the propagation of the delay on the passengers (i.e., increasing wait-for-pax time to avoid passengers missing connections).

This same tendency is observed on the results when SESAR and ground improvements are implemented.

*b. An increase in the number of passengers claiming delay compensation should increase the airlines costs.*

As the results show, Figure 57 and Figure 58, the benefit observed on the airlines costs by the introduction of the optimisation strategy are reduced when the number of passengers claiming compensations is increased. For example, in the SESAR and ground improved traffic the average benefit of the optimised strategy with respect to the current strategy is of 0.7% but it is only of 0.2% when the number of compensation claims are included. Similarly, the passenger costs for primary delay increase higher than in the optimised strategy and the benefit observed in the reactionary passenger costs is lower; in the case of high delay, this benefit is in average lower than 1% and as shown in the figure overlaps substantially with the results observed in the non-optimised strategy.

### 7.1.9 Cost hypothesis 4

**Statement**

HC4: Delay: The delay input will impact the operational costs directly. Higher delays in the system will lead to higher costs.

**Hypothesis analysis:**

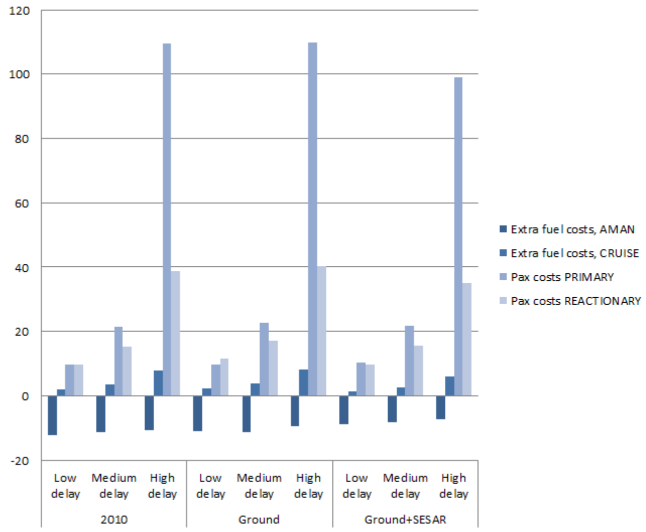
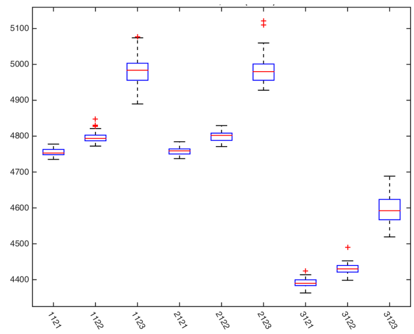
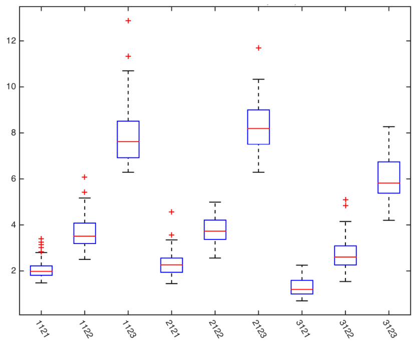


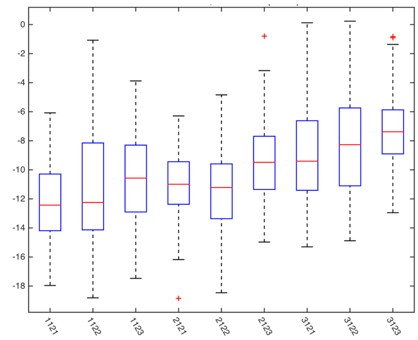

Figure 59- Average airline costs as function of delay for optimised operations as a function of delay scenarios



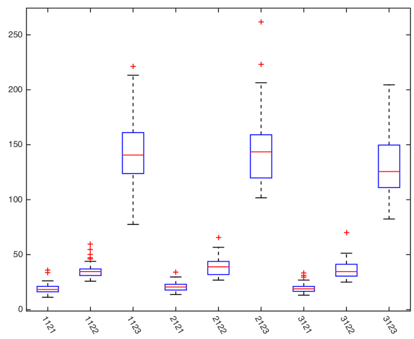
(a) Average airline cost (€)



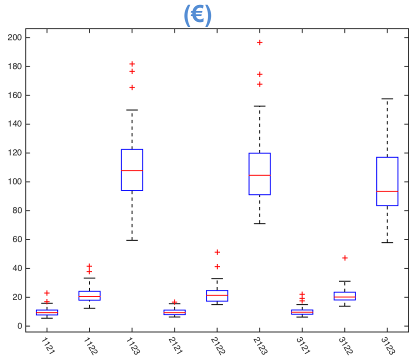
(b) Average cruise extra fuel cost (€)



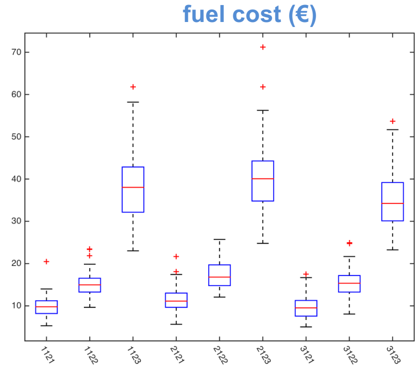
(c) Average AMAN extra fuel cost (€)



(d) Average passengers costs (€)



(e) Average primary passengers costs (€)



(f) Average reactionary passengers costs (€)

Figure 60- Cost as a function of database and delay

As expected, the average airline cost increases if the delay in the system increases, see Figure 59. With respect to the medium delay scenario, a low delay scenario leads to an average reduction of the airline costs of 0.9% for the three traffic scenarios (2010, ground improvements and SESAR and ground improvements); if the delay selected is high, the average increment in cost is around 3.8%, see Figure 59 and Figure 60(a).

There are different costs that have been analysed: extra fuel cost at cruise and at the AMAN and the passenger costs (primary and reactionary), (see Figure 60(b)-(f)). The fuel costs during the cruise is sensitive to the delay experienced, higher delay lead to higher extra costs that will be related with the fact of having more flights speeding up to recover delay. However, at the AMAN phase there is a minimal difference due to the initial delay in the system. For the passengers costs there is an increment as the delay in the system is higher, but it is interesting to note that the increment is higher for primary delay while the cost due to reactionary delay is increased in a lower percentage.

## 7.1.10 Efficiency hypothesis 1

**Statement**

HE1: Fuel: An increment in fuel cost will lead to lower emissions.

**Hypothesis analysis:**

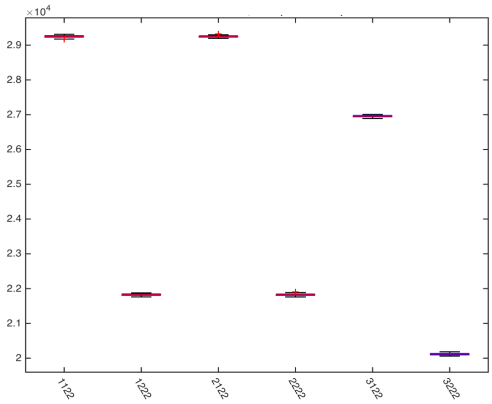
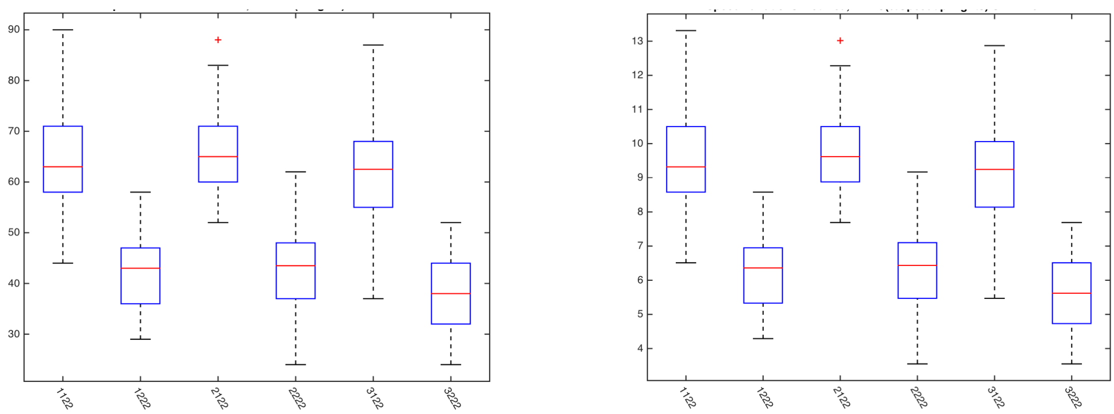



Figure 61- Average $CO_2$ emissions as a function of fuel cost

As presented in Figure 61, there is a reduction on the amount of emissions of around 25% when the fuel cost selected is higher with respect to same scenario and medium cost of fuel. This values is found for 2010, ground, and ground and SESAR improvement scenarios when an optimisation of the flights (strategy 2) is selected for medium delay.




(a) Number of flights (b) Percentage of flights

Figure 62- Number of flights doing speed variations during their cruise as a function of fuel cost

Note that in the optimised strategy, when the fuel is increased from nominal to high, there is a reduction on the number of flights doing speed variations (average reduction of around 35%, from an average higher than 9% of flights speeding up to only around 6% of the flights in the medium delay scenarios), see Figure 62.

### 7.1.11 Efficiency hypothesis 2

**Statement**

HE2: Strategy: Emissions might increase with strategy (2) and (3) as DCI is allowed and higher fuel consumption might be expected.

**Hypothesis analysis:**

As shown in Figure 61 and in Figure 63,  in nominal conditions (medium delay) the emissions are reduced when an optimisation strategy is selected with respect to current strategy. The reduction is independent to the number of passengers claiming compensation. This reduction is in average between 0.4% and 0.5% on the emissions and present for 2010 traffic and SESAR + ground improved traffic.

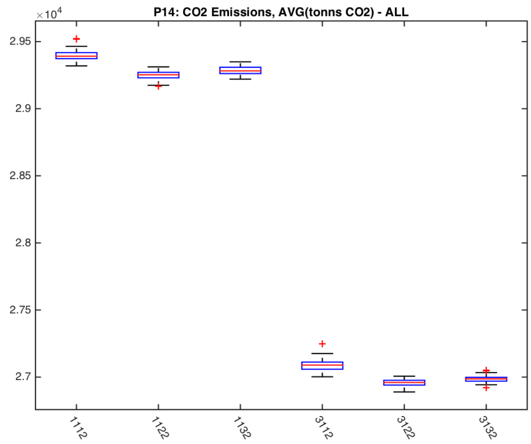



**Figure 63 - Difference on CO2 emissions as a function of optimisation strategy**

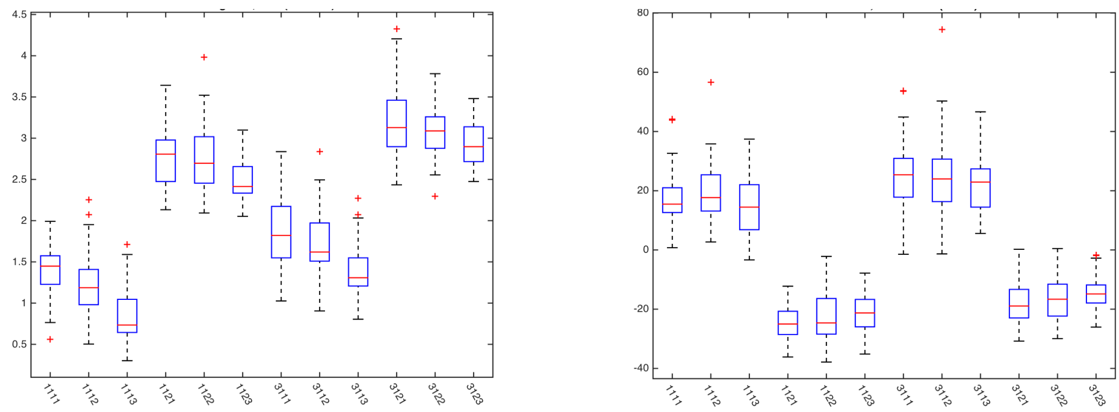
 

### 7.1.12 Efficiency hypothesis 3

**Statement**

HE3: Holding time: It is expected to increase when the delay is high.

**Hypothesis analysis:**




(a) Average holding time (min)

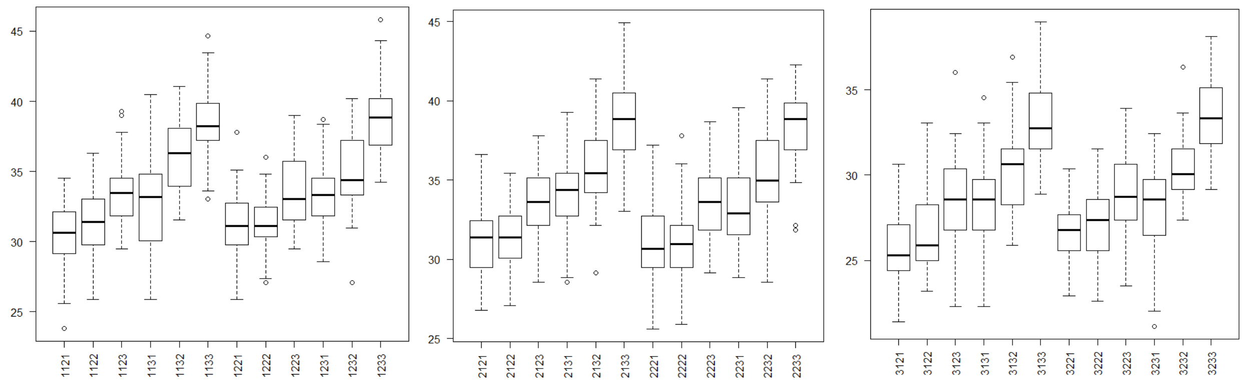
(b) Average extra fuel costs (€)

Figure 64- AMAN effect on delay and fuel cost

When delay increases, results suggest that there is a reduction on the holding times generated by the AMAN. This reduction is observed in both 2010 and Ground and SESAR traffic and for standard operational strategies and optimised strategies. As observed in Figure 64(a), there is some overlap on the possible values obtained in the simulations. In average, these reductions of delay range between 3% and 31%.

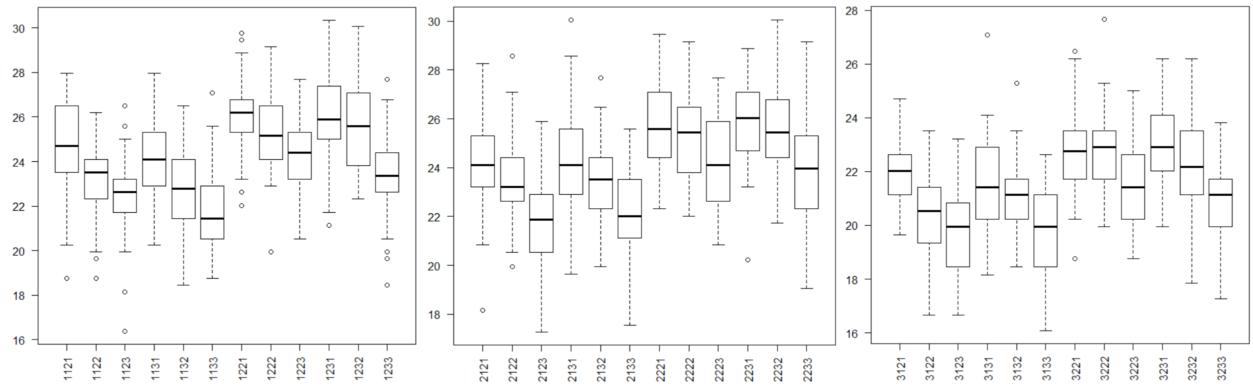
On the other hand, there is a notable difference between the holding delay generated in the current operation strategy and in the optimised strategy. These differences are observed in both 2010 and in Ground and SESAR traffic, and in average range between 69% and 198%. For example, in the 2010 traffic with medium delay there is an increment of 126% of delay in average between current and the optimised strategy. Note that the relative values are very high but that the actual delay assigned per flight during the AMAN is low lower than 2 minute for 2010 traffic without optimisation and on average 3 minutes for the optimised simulations.

If focus is given to the extra fuel that is used during the AMAN with respect to the fuel used if the trajectory were not regulated, see Figure 64(b), results show that there is no difference as a function of the delay. However, in this case, the optimised strategy represents a reduction on fuel consumption in all the analysed scenarios. In this case, in the current operational strategy, there is positive extra fuel consumption, but on the optimised strategy some fuel is saved. In the non-optimised strategy, to maximise the throughput at the airport, the AMAN assigns to the flight the first slot that the flight can reach, even if that implies some speeding up, and therefore using more fuel. On the contrary, in the optimised strategy flights assess the potential cost of all the available slots and negotiate with the AMAN to obtain the slots that minimise their cost. This means that in some cases delay might be selected if the fuel savings compensate any other cost generated by the delay.




(a) 2010 traffic (b) Ground improvements (c) SESAR and ground improvements

**Figure 65- Percentage of flights selecting a slot different than obtained if keeping current speed**




(a) 2010 traffic (b) Ground improvements (c) SESAR and ground improvements

**Figure 66- Percentage of flights selecting a slot later than obtained if keeping current speed**

Finally, as it is observed in Figure 65, the results the number of inbound flights that select a slot that is not the closest to the one they would get assigned, i.e., the airline voluntarily selects a slot that requires a modification of speed (speeding up or reducing speed) varies between 25% and 35% of all the inbound flights on the optimised strategies.

Figure 66 shows the percentage of flights that decide to voluntarily select a slot that is later than the one they would have obtained in a nominal AMAN operation (i.e., without modifying their speed). As observed, there is a percentage of flights that decide to reduce speed, obtaining fuel savings, and generating delay during the AMAN phase.

Note also that the total number of flights that select a slot that is not the one they would obtained by maintaining their speed increases as a function of the delay (see Figure 65), but the number of flights that select a slot later, generating delay, decreases (see Figure 66); showing that when delay is high in the system, delay cost might be higher than the potential fuel savings.

It is interesting to see that the number of flights that do this fuel and delay strategy optimisation at the AMAN phase is similar between 2010 traffic and ground improved traffic but slightly decreases when SESAR improvements are considered (see Figure 66). Finally, when the number of passengers that claim compensation is increased, the number of flights that decide to select a slot that implies an speed up increases (there are more flights selecting a slot different that the one they would get maintaining their speed with respect to the optimised strategy, but the number of flights selecting a slot that generates delay is similar for both strategies) (see Figure 65).

## 7.2 Results of analysis

The analysis of the hypothesis has led to the following summarised findings per hypothesis:

1. HD1: Flight databases: Ground and SESAR improvements should reduce overall gate-to-gate time for connecting passengers. However, keeping everything else equal, there is a higher risk for passengers missing connections, or an increase in wait-for-pax time.

The hypothesis is accepted based on the data observed. Overall there is a reduction of 0.36% for ground improvements and of 4.5% for SESAR improvements. SESAR improvements generate a higher benefit for non-connecting passengers than for connecting passengers.

The cost optimisation leads to an average the gate-to-gate time increment in around 1.1% for all the scenarios. For non-connecting passengers the gate-to-gate trip increases by 0.4% in average, while connecting passengers decrease their gate-to-gate time in 0.8% for medium delay and 0.6% for high delay. Results show that the optimisation is trading delay of non-connecting passengers for connecting passengers' delay.

The number of passengers missing connections is independent of the traffic scenario considered but the cost optimisation strategy reduces the number of missed connections between 14.4% and 24.7%. This is achieved by increasing the number of flights performing wait-for-passengers and the average time that it is waiting.

Waiting times at airport for connecting passengers decreases (in average 1.8%) when ground improvements are implemented and in a further 1.6% when the cost optimisation strategy is followed by the airlines.

2. HD2: Fuel costs: An increase in fuel cost is expected to decrease average cruise airspeed, increasing slightly the passenger delay, and overall gate-to-gate time.

Fuel cost has an impact on the number of flights doing speed variations, but passengers' metrics are not affected.

3. HD3: Strategies: The impact of cost optimisation strategy on delay is unknown a priori. It is expected to reduce delay on operators with connecting passengers, while it may increase the delay on operators without connecting passengers.

The hypothesis is not sported by the results observed in the simulations. All airlines experience a worsening on the gate-to-gate trip time of their passengers of an average of 1%. In general, there is slightly improvement on the average delay experienced by passengers with connections of around 0.7%, on the other hand passengers without connections have longer gate-to-gate trips of around 0.4%. This trade-off effect is greater in airlines with connecting passengers (e.g., FSC) rather than in airlines with few connecting passengers' itineraries (e.g., LCCs). The objective of the optimised strategies is to minimise the cost and the results suggest that this is achieved by trading non-connecting and connecting passengers' delays. A small delay for direct flight passengers has a cost for the airlines that is smaller than the potential cost of connecting passengers missing connections at the hub. This is aligned with the reduction of missed connections observed (HD1).

4. HD4: Strategies: Higher claims on passenger compensation (strategy 3) might lead to fewer connections missed and a reduced gate-to-gate time.

The first part of the hypothesis is supported by the findings, since the missed connections are reduced. The second part of the hypothesis is not supported by the findings. Increasing the number of passengers claiming compensations does not reduce the overall gate-to-gate time for passengers. It might have an impact on the distribution of the delay within the passengers, but this has not been captured by any indicator on the simulations. Note that the number of passengers entitled to compensations is low. For the number of missed connections, it is observed an average reduction on the number of passengers missing connection but with an overlap of possible values between the different scenarios simulated.

5. HD5: Flight databases: SESAR improvements will reduce total cruise distance and the possibility of recover delay with speed variation strategies.

The hypothesis is not fully supported. There is a lower estimated delay that can be recovered by speeding up at the top of climb in the SESAR improved scenarios (in average 7% lower than in the 2010 traffic). In general, the shorter cruises lead to slightly higher speed selected (in average 3% higher). Thus, higher speeds are selected but less delay is expected to be recovered. However, this difference in potential delay recovered is absorbed by the system and the total arrival delay is similar in both scenarios.

6. HC1: Flight databases: More restrictive schedules (i.e., ground improvements) will increase the operations costs, since there is a higher risk for delay.

This hypothesis is rejected by the data, when ground improvements are introduced the cost for the airlines is not modified. There are benefits by introducing SESAR improvements but due to the shortening of the routes.

7. HC2: Fuel costs: Higher fuel cost will increase overall operation costs. Aircraft will tend to fly slower to reduce fuel cost, but delay cost will increase.

The first part of the hypothesis has been validated: higher fuel cost lead to higher operational costs (average increment of 18.7%). It also has an impact on the number of flights that decide to increase the speed with and average reduction of in average 34.7% in 2010 traffic, 39.2% in SESAR and ground improvement scenario and 25.1% in the SESAR and ground scenario with higher passenger complains. However, the total delay experienced is similar and the passenger costs do not increase.

8. HC3: Strategy: Optimisation strategy (2) should reduce costs by a small percentage. The margin of improvement is, however, unknown. An increase in the number of passengers claiming delay compensation (3) should increase the airlines costs.

The hypothesis is supported by the findings. There is an improvement on the costs in average of 0.7% for medium delays in both the 2010 and the SESAR and ground improved traffic. This benefit is partially achieved by reducing the passenger costs and in particular the passengers' reactionary costs.

However, in high delay scenarios, airlines benefits decrease to around 0.2-0.5%. Increasing the number of passengers claiming compensation slightly reduce the benefit of the optimised strategy.

9. HC4: Delay: The delay input will impact the operational costs directly. Higher delays in the system will lead to higher costs.

The hypothesis is supported by the data. The initial delay in the system plays an important role on the total cost that airlines experience. If higher delay is modelled in the system, the savings in fuel that are observed at the AMAN decrease (see HE3) and the extra costs in fuel and passenger costs increases.

10. HE1: Fuel: An increment in fuel cost will lead to lower emissions.

The hypothesis is supported by the observed data. In nominal conditions (medium delay) with airlines optimising their strategies, the increment in fuel cost will make airlines fly slower, reducing fuel consumption and emissions by approximately 25%. The number of flights that decide to increase the speed is reduced by 35%.

11. HE2: Strategy: Emissions might increase with strategy (2) and (3) as DCI is allowed and higher fuel consumption might be expected.

This hypothesis is rejected by the results. The opposite conclusion has been found. An optimisation that allows speed variations lead to lower emissions (i.e., lower fuel consumptions) than current operations. The main reason for this is that the optimisation is considering the total cost, including fuel consumptions, while in the current operations, even if a few flights are allowed to recover delay, there is no assessment on the fuel that that recovery will represent. Moreover, in the optimised strategy wait-for-passengers seems to be playing a role as important as speed variations to minimise airline operations costs. The extra cost of fuel required to increase the speed leads to small speed increments on the optimised scenarios, i.e., the flights that decide to speed up increase their speed in a lower percentage than in the non-optimised strategy scenario.

12. HE3: Holding time: It is expected to increase when the delay is high.

The hypothesis is rejected as higher initial delays leads to lower AMAN delays. These reductions of delay range between 3% and 32% depending on the scenario.

With the cost optimised strategy, delays generated at the AMAN increase in a range between 70% and 200%; but the optimised strategy generates a reduction on fuel consumption in all the analysed scenarios in the AMAN. In the non-optimised operations there is a positive extra fuel consumption, but on the optimised strategy some fuel is saved. The optimisation negotiates with the AMAN to select the most cost effective slot, which might trade delay for fuel. The number of inbound flights that select a slot that is not the closest to the one they would get assigned, i.e., the airline voluntarily selects a slot that requires a modification of speed varies between 25% and 35% of all the inbound flights on the optimised strategies. From those around 24% select a slot that generates delay and saves fuel. If the initial delay in the system is increased, the number of flights recovering delay increases and the number of flights trading fuel for delay decreases. When the number of passengers that claim compensation is increased, the number of flights that decide to select a slot that implies speeding up increases.

## 7.3 Particular examples: feedback loops and emergence

### 7.3.1 Example of flights DCI

From all the simulations performed, a flight to the hub has been analysed in different conditions to present the optimisation of the CI at different phases during the flight. The flight covers a GCD of 925 NM from the origin to the hub with 15 outbound connecting flights. Three different examples are presented with different scenario characteristics as summarised in Table 21. In order to be able to compare the processes the same flight has been considered with and without the optimisation but with similar initial delay. Note that these are the results from stochastic simulations and therefore the specific conditions of the system and flight might vary from simulation to simulation.

| Example | Scenario coding | Strategy | Traffic | Fuel cost | Initial delay | Estimated delay at TOC (min) |
|---|---|---|---|---|---|---|
| 2010 – nominal | 1112 | Standard | 2010 | Nominal | Medium | 43 |
| | 1122 | Optimised | | | | 43 |
| Ground and SESAR – nominal | 3112 | Standard | Ground and SESAR | | | 44 |
| | 3122 | Optimised | | | | 44 |
| Ground and SESAR – high | 3213 | Standard | | High | High | 47 |
| | 3223 | Optimised | | | | 47 |

Table 21 – Example flights characteristics

#### a) 2010 - nominal

As shown in Table 22 at TOC the flight estimates an arrival delay of 43 minutes. However, as this is the standard operations and no optimisation is done, the flight keeps its nominal speed, which gives a forecast of inbound cost of EUR 837, at that moment, there are 5 outbound flights connecting with the delayed inbound that will wait for the passengers and further 10 outbound that will no wait if passengers are late and miss their connections. These 5 outbound flights waiting have decide to wait considering that some previous inbounds might be accelerating. The forecast total cost will be EUR 5,650.

When the flight enters the arrival manager the slots available are submitted to the aircraft operator as described in Table 22. In this case, selecting the second slot (A2) will lead to a lower total cost. The reason is that there will be a higher cost for the inbound flight but an outbound flight would no wait for the passengers leading to a lower passenger costs for the outbound flights. However, as the strategy is to select the earliest slot possible to minimise the delay the first option is selected, leading to a total estimated delay of 44 minutes and an estimated cost of EUR 5,679.

| | Inbound | | | | | | | Outbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Opt. at (T)OC and (A)MAN | Est. arr. Delay (min) | cruise extra fuel(€) | pax costs (€) | crew costs (€) | Tot cost (€) | waiting | not waiting | extra fuel (€) | pax costs (€) | crew costs (€) | Tot cost (€) | Tot option cost (€) |
| T1* | 43 | 0 | 204 | 632 | 837 | 5 | 10 | 29 | 4248 | 537 | 4813 | 5650 |
| A1* | 44 | 2 | 216 | 649 | 867 | 5 | 10 | 29 | 3993 | 791 | 4813 | 5679 |
| A2 | 47 | 51 | 254 | 700 | 1004 | 4 | 11 | 29 | 2643 | 791 | 3463 | 4467 |

* option selected

Table 22 – Example flight 1112

The same flight is analysed but in a scenario with an optimising strategy. As presented in Table 23, in this case, at the TOC, the flight has 4 different options and, recovering 2 minutes will lead to a lower cost estimation forecasting a saving of EUR 209 with respect to not recovering any but also being a more economical solution than recovering more delay (saving of EUR 454 with respect to recovering 3 minutes). Note how the number of outbound flights that would wait for the passengers varies as the delay recovery varies. It is important to note that some of the outbound that are waiting might be already been waiting for other delayed inbound flights and therefore this one benefits from that information knowing that passengers will made their connection and that there is no incentive for speeding up.

In this flight, 41 minutes of delay were expected to be achieved at the arrival on the decision assessed at the TOC but when the flight enters in the AMAN the slots available range from 37 of delay to 40 minutes of estimated arrival delay, as presented in Table 23. Considering the updated information regarding to the outbound flights, the first slot gives is selected as it estimates the lowest cost. Note also that at the TOC some of the outbound flights have an estimated extra fuel costs, meaning that they were planning to do DCI to recover part of the delay due to the waiting, however, at the AMAN the situation has changed and the optimal solution is to not speed up any of the outbound flights.

| | Inbound | | | | | | | Outbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Opt. at (T)OC and (A)MAN | Est. arr. Delay (min) | cruise extra fuel(€) | pax costs (€) | crew costs (€) | Tot cost (€) | waiting | not waiting | extra fuel (€) | pax costs (€) | crew costs (€) | Tot cost (€) | Tot option cost (€) |
| T1 | 43 | 0 | 208 | 718 | 926 | 6 | 9 | 19 | 1237 | 971 | 2227 | 3154 |
| T2 | 42 | 20 | 196 | 702 | 918 | 8 | 7 | 0 | 1230 | 1133 | 2363 | 3281 |
| T3* | 41 | 46 | 185 | 685 | 916 | 6 | 9 | 0 | 1173 | 856 | 2029 | 2945 |
| T4 | 40 | 73 | 178 | 675 | 926 | 7 | 8 | 19 | 1237 | 1216 | 2472 | 3399 |
| A1* | 37 | -86 | 136 | 614 | 663 | 6 | 9 | 0 | 1057 | 692 | 1749 | 2412 |
| A2 | 40 | -38 | 166 | 673 | 801 | 8 | 7 | 0 | 1049 | 1222 | 2272 | 3073 |
| A3 | 43 | 33 | 200 | 732 | 965 | 6 | 9 | 0 | 1080 | 873 | 1953 | 2918 |

* option selected

Table 23 – Example flight 1122

### b) Ground and SESAR - nominal

In this second example the introduction of SESAR and ground improvements is analysed. Table 24 shows the situation of the flight at the TOC when no optimisation is implemented, the estimated delay at arrival is 44 minutes and the forecast total cost will be higher than EUR 6,203. When reaching the AMAN, the first slot available will leave the flight with 44 minutes of delay and that will be the one selected with a total estimated cost of EUR 5,440.

| | | Inbound | | | | | | Outbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Opt. at (T)OC and (A)MAN** | **Est. arr. Delay (min)** | **cruise extra fuel(€)** | **pax costs (€)** | **crew costs (€)** | **Tot cost (€)** | **waiting** | **not waiting** | **extra fuel (€)** | **pax costs (€)** | **crew costs (€)** | **Tot cost (€)** | **Tot option cost (€)** |
| T1* | 44 | 0 | 213 | 352 | 565 | 5 | 10 | 0 | 4880 | 758 | 5638 | 6203 |
| A1* | 44 | -7 | 216 | 356 | 565 | 5 | 10 | 0 | 4124 | 751 | 4875 | 5440 |
| A2 | 47 | 38 | 254 | 389 | 681 | 4 | 11 | 0 | 5641 | 751 | 6392 | 7073 |
| A3 | 50 | 109 | 294 | 422 | 825 | 4 | 11 | 0 | 3391 | 751 | 4142 | 4967 |

* option selected

Table 24 – Example flight 3112

In the optimised strategy, the flight reaches the TOC with an estimated arrival delay of 44 minutes and even if 3 minutes can be recovered, the option that leads to the lower total estimated costs is to not recover any delay and maintain the nominal cruise speed (see Table 25). If the flight decides to recover the maximum delay possible, there is an estimate increase of 18.8% on the total cost. In this case, at the AMAN the first slot is also the best option leading to an estimated delay of 38 minutes.

| | | Inbound | | | | | | Outbound | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Opt. at (T)OC and (A)MAN** | **Est. arr. Delay (min)** | **cruise extra fuel(€)** | **pax costs (€)** | **crew costs (€)** | **Tot cost (€)** | **waiting** | **not waiting** | **extra fuel (€)** | **pax costs (€)** | **crew costs (€)** | **Tot cost (€)** | **Tot option cost (€)** |
| T1* | 44 | 0 | 213 | 432 | 646 | 6 | 9 | 0 | 1225 | 803 | 2029 | 2674 |
| T2 | 43 | 22 | 201 | 423 | 646 | 6 | 9 | 0 | 1539 | 902 | 2441 | 3087 |
| T3 | 42 | 48 | 189 | 413 | 650 | 6 | 9 | 0 | 1225 | 801 | 2027 | 2677 |
| T4 | 41 | 71 | 184 | 408 | 662 | 7 | 8 | 0 | 1643 | 871 | 2514 | 3177 |
| A1* | 38 | -24 | 149 | 375 | 500 | 6 | 9 | 0 | 1097 | 872 | 1969 | 2470 |
| A2 | 44 | -2 | 216 | 451 | 666 | 6 | 9 | 0 | 1096 | 896 | 1992 | 2657 |
| A3 | 47 | 64 | 254 | 493 | 811 | 5 | 10 | 0 | 1242 | 802 | 2045 | 2856 |
| A4 | 41 | -57 | 181 | 410 | 534 | 6 | 9 | 0 | 1559 | 797 | 2356 | 2890 |

* option selected

Table 25 – Example flight 3122

### c) Ground and SESAR - high

| | | Inbound | | | | Outbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Opt. at (T)OC and (A)MAN | Est. arr. Delay (min) | cruise extra fuel(€) | pax costs (€) | crew costs (€) | Tot cost (€) | waiting | not waiting | extra fuel (€) | pax costs (€) | crew costs (€) | Tot cost (€) | Tot option cost (€) |
| T1* | 47 | 0 | 251 | 477 | 728 | 4 | 11 | 0 | 3457 | 1304 | 4761 | 5489 |
| A1* | 47 | 18 | 254 | 479 | 752 | 5 | 10 | 0 | 4131 | 1329 | 5461 | 6212 |
| A2 | 50 | 54 | 294 | 519 | 868 | 4 | 11 | 0 | 6248 | 1315 | 7563 | 8431 |
| A3 | 53 | 158 | 337 | 561 | 1056 | 4 | 11 | 0 | 7498 | 1315 | 8813 | 9869 |
| A4 | 56 | 248 | 380 | 602 | 1231 | 4 | 11 | 0 | 4598 | 1315 | 5913 | 7144 |

* option selected

Table 26 – Example flight 3213

In this case, on the non-optimised simulation the initial 47 minutes of estimated arrival delay are maintained through the operation as shown in Table 26.

In the optimised simulation the initial 46 minutes of estimated arrival delay increased by selecting an arrival slot that is later than the earliest possible, as shown in Table 27. However, an estimated saving is obtained by selecting this slot. The fact that lower passenger costs for the outbound are obtained by selecting a later arrival slot might be related to the provision costs entitled to connecting passengers when they miss their connection, by arriving later, the waiting time is reduced and hence the provision costs.

| | | Inbound | | | | Outbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Opt. at (T)OC and (A)MAN | Est. arr. Delay (min) | cruise extra fuel(€) | pax costs (€) | crew costs (€) | Tot cost (€) | waiting | not waiting | extra fuel | pax costs (€) | crew costs (€) | Tot cost (€) | Tot option cost(€) |
| T1 | 46 | 0 | 243 | 342 | 585 | 5 | 10 | 0 | 7338 | 4696 | 12034 | 12619 |
| T2 | 45 | 32 | 230 | 335 | 597 | 7 | 8 | 0 | 7503 | 4943 | 12446 | 13043 |
| T3* | 44 | 77 | 218 | 328 | 623 | 6 | 9 | 0 | 6789 | 4819 | 11608 | 12231 |
| T4 | 44 | 107 | 213 | 325 | 645 | 6 | 9 | 0 | 7439 | 4819 | 12258 | 12903 |
| A1 | 43 | -29 | 202 | 322 | 495 | 5 | 10 | 0 | 7802 | 4618 | 12420 | 12915 |
| A2 | 46 | 7 | 239 | 355 | 601 | 6 | 9 | 0 | 7617 | 4937 | 12554 | 13155 |
| A3* | 49 | 111 | 279 | 387 | 777 | 6 | 9 | 0 | 7154 | 4972 | 12125 | 12902 |
| A4 | 52 | 203 | 320 | 420 | 943 | 5 | 10 | 0 | 7591 | 4554 | 12146 | 13088 |

* option selected

Table 27 – Example flight 3223

d) **Non-optimisation but speed increment at TOC**

This final example, presented in Table 28, presents a different flight (1,000 NM on GCD) on a non-optimised scenario but that is part of the 10% of flights that recover delay by speeding up. Note that at the TOC the flight tries to recover as much delay as possible (with a remaining of 5 minutes) reducing its estimated delay from 40 to 31 minutes. When arriving at the AMAN the first slot possible is selected with leads to a total estimated arrival delay of 29 minutes. Thus, even if the delay has been reduced from an estimation of 40 to an estimation of 29, the option is not the most cost efficient (1.5% more expensive at the TOC and 6.6% more expensive at the AMAN).

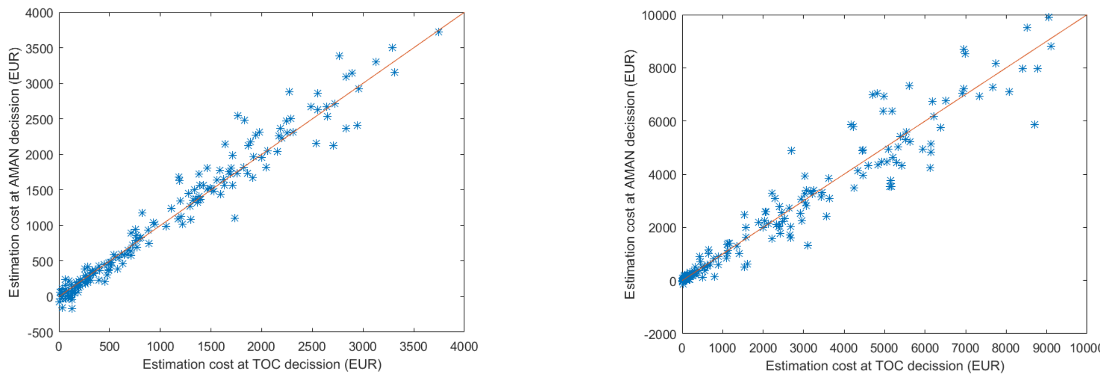
| Inbound | | | | | | Outbound | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Opt. at (T)OC and (A)MAN** | **Est. arr. Delay (min)** | **cruise extra fuel(€)** | **pax costs (€)** | **crew costs (€)** | **Tot cost (€)** | **waiting** | **not waiting** | **extra fuel** | **pax costs (€)** | **crew costs (€)** | **Tot cost (€)** | **Tot option cost(€)** |
| T1 | 40 | 0 | 78 | 758 | 836 | 23 | 10 | 0 | 10392 | 2404 | 12796 | 13632 |
| T2* | 31 | 2337 | 41 | 591 | 2969 | 26 | 7 | 0 | 8373 | 2492 | 10865 | 13834 |
| A1* | 29 | 1825 | 34 | 552 | 2410 | 26 | 7 | 0 | 11442 | 3778 | 15220 | 17631 |
| A2 | 32 | 1332 | 44 | 620 | 1996 | 25 | 8 | 0 | 11536 | 3750 | 15286 | 17283 |
| A3 | 35 | 1468 | 55 | 689 | 2213 | 23 | 10 | 0 | 10535 | 3750 | 14285 | 16498 |
| A4 | 38 | 1644 | 69 | 758 | 2471 | 22 | 11 | 0 | 11635 | 3750 | 15385 | 17856 |
| A5 | 41 | 1797 | 84 | 826 | 2706 | 21 | 12 | 0 | 11157 | 3750 | 14907 | 17613 |
| A6 | 44 | 2023 | 100 | 895 | 3017 | 21 | 12 | 0 | 10457 | 3750 | 14207 | 17224 |

* option selected

**Table 28 – Example flight no optimisation but changing speed at TOC**

## 7.3.2 Cost estimated variation

It is interesting to observe that when the flight was at the TOC the estimation of the delay that would be recovered and its costs might be different to the costs observed at the AMAN. This is mainly due to the uncertainties in the system, the slot capacity constraints at the AMAN and to the interactions with the outbound flights. When the flight is at the scope of the AMAN the number of outbound flights waiting for passengers might be different. For example at the TOC for the 2010 traffic nominal example (see Table 23) the estimated cost for arriving with 43 minute of delay is EUR3,154, but at the AMAN, the slot that estimates the arrival delay at 43 minutes (A3) forecast an estimated cost of EUR 2,918, 7.5% lower. This variation is due to the new situation of the system at that time, in this particular example the outbound estimated costs are lower.




(a) Optimised strategy (b) Non-optimised strategy

**Figure 67- Variation between estimated cost with option selected at TOC and slot selected at AMAN for a simulation with 2010 traffic, nominal fuel costs and initial delay**

Figure 67 presents the difference between the estimated cost at the strategy decided at the TOC and the estimated cost once the arrival slot has been selected at the AMAN for two specific simulations with and without the optimisation strategy. In the optimised strategy, it seems that for low TOC estimation costs there is an over estimation of the cost with respect to what it is computed at the AMAN while for high costs the estimation at the AMAN is even higher. This however, would require further analysis.

### 7.3.3 Feedback loops and emergent behaviour

As presented in the previous examples, when an inbound flight is deciding the DCI strategy at the TOC, the aircraft operator has to consider the situation of the outbound flights that will be connecting the flight passengers. For each delay recovery possibility, the best strategy for the outbound flights is assessed, considering the situation of all the inbound flights and the possibility of delaying the flight to wait for the passengers and the use of DCI for the outbound flight.

Once the inbound has decided to select a given DCI option, a set of delay for outbound flights in order to wait for the inbound passengers is assigned. This means that when a different inbound flight is delayed, if some of the outbound flights are already waiting it might not be necessarily to speed up the flight. When the possibilities of an outbound flight are recomputed because a new inbound flight is at their TOC, the information of the estimated delays of all the inbound flights feeding that outbound flight are considered. Finally, note that by the time the inbound flight arrives to the AMAN the situation in terms of outbound flights waiting might be different leading to a selection of slots that not necessarily is the first one available.

These interactions can only be captured with the agent base model used within CASSIOPEIA, analytical models like queue models are not able to capture the feedback loops generated when inbound and outbound cost optimizations strategies are applied simultaneously. It is not enough to optimise the cost of each individual flight, but rather as a system of systems in which each system is a particular flight connected through the passengers.

Only when analysing the aggregated indicators obtained from the simulations the emergent behaviour of the system can be observed. Initially each flight has a particular set of optimization costs, but since it makes its decisions according to the rest of the flights the emergent outcome can be very different than if each flight made an individual decision. As a striking result observed in the simulations, delay is not often minimised by optimising the airlines operations costs. Moreover, longer gate-to-gate times are observed for the passengers. The selection of slots that are not the earliest possible was unexpected a priori and in some cases and there is a limited usage of speed adjustment in comparison with a notarial increment on the waiting for passengers when optimising the system. This is a clearly emergent behaviour that defies the initial intuition.

# 8 Further work

## 8.1 Further analysis

The focus of the project was the analysis of delay recovery strategies and how their optimisation could improve airline costs and reduce passenger delay. This has derived into a series of metrics and indicators to provide the information the researchers thought useful, and explored certain relationships among these metrics. However, further work could be executed by exploring other metric dependencies among the existing indicators, generating further indicators to explore more dependencies, or even changing the focus of the model as explained later in the model and platform enhancement. Further analysis could be conducted to explore the sensitivity and stability of the solutions; for example, the capacity of the airport has been set so that it did not generate additional delay as that was not the focus of the project, but different arrival capacities could be assessed.

The speed envelope of the flights when implementing SESAR enhancement should be modified to select the nominal cruise speed and flight envelope corresponding to the fuel performance selected as showed in section 4.1.3. This has had a small impact on the results of SESAR options as explained in section 7.

As shown in the individual examples there is uncertainty when deciding the DCI at the TOC and the estimated costs changes when the flight reassess the situation at the AMAN, this relationship could be analysed to see how the uncertainty increases or decreases.

## 8.2 Model and platform enhancement

**AMAN**

The conclusions of the model invite to explore in further detail the efficiency of the AMAN. The runway throughput is controlled by the AMAN and there is room for improvement, since its time horizon could be extended further than 60 minutes. This would entail designing new algorithms to better negotiate the arrival time of the flights and maintain the flexibility required for last minute changes, especially for those flights which are closed to the destination airport, which need an arrival slot subject to change. The AMAN slot assignment algorithm could also be improved using learning algorithms through which it could predict delays and modify slots accordingly.

**Airlines strategies**

Currently the optimisation strategy considers modifying the arrival times of flights in a downstream manner, however, while it would be challenging, it could be possible to implement algorithms for modification of upstream flights, meaning that different inbound flights optimise their cost index based on the modification of other inbound and common outbound flights. This, however, would create a ripple effect, which entails a computation challenge for the model.

The cost distribution for the different airlines is usually quite different; therefore, it would seem appropriate to include differences on the strategies based on the operator classification.

The relationship between costs estimation at the TOC and at the AMAN could lead to an optimisation where not the option with the lowest estimated outcome is selected but the solution that has a higher probability of deliver a lower cost. This strategy could be learned by the algorithm.

Finally, it has been shown that the delay that is finally recovered is in some cases lower than the estimated at the TOC and at the AMAN scope. It would be interesting to add a learning process for which the airlines try to recover more delay than the one they envisage as they learn that some of it would not be finally recovered due to the system situation.

Note also that the current operation strategy could be modified to better represent the current practices, such as limiting the speed increment based on forecast fuel consumption.

**Cost calculations**

Further analysis of the results of the project could provide valuable insight to model cost of the flights without considering the exact fares of each passenger. If a reliable model was generated, it would be possible to improve the computation time and it could be implemented into other airports for which lower information of passenger can be obtained.

**Airport selection**

As presented, there might be other airports more suitable for DCI strategies implementation. It would be interesting to assess this strategy at different hubs to see if the traffic pattern delivers different operational strategies (e.g. reducing the number of flights doing wait-for-passengers and increasing the flights recovering by using DCI).

**Platform enhancement**

From the computer science perspective, it would be a great improvement the development of automated data analysis, which could be used for the vast amount of results obtained.

Algorithm optimisation for computation time reduction would also be a next step in the software development part. This could be achieved through the implementation of different strategies for finding local and global minimums of functions. Additionally, the implementation of concurrent agent processing would reduce computation time dramatically, since with the current design processing cannot be executed in parallel machines.

## 8.3 Further extensions and applications

**Passenger compensation regulations**

The model has been specifically designed to test passenger compensation regulations; therefore, any future change on this regulation could be implemented and tested to understand its predictive impact on the different stakeholders, especially the passengers themselves.

**Unusual situations**

The model could be used to analyse unusual situations such as capacity limiting factors like bomb threats or low-visibility procedures situations. It would be able to provide impact on passengers and airlines' metrics.

**Implementation of other SESAR enablers**

The model could be used to understand the effect of the implementation of different SESAR enablers that could improve runway throughput. Just as well, the improvement of runway throughput would improve the airport capacity, allowing further demand to be accommodated.

**Airline delay recovery**

While it would require a lot of work to synchronize the model with the actual operations of an airline, the application of the optimised operations into a hub airline, would allow them improve their revenue. This would entail the inclusion of a learning algorithm, through which the model would feed on the information of the operations to improve its predictions, improving constantly its optimisation strategies.

# 9 Conclusions

The CASSIOPEIA platform has proven very useful to assess scenarios where different individual agents play a role, such as the one presented in DCI-4HD2D.

The future air traffic environment has been modelled, including:

- Dynamic Cost Indexing,
- SESAR objectives such as direct routing, extended approach manager, and collaborative decision making processes,
- Operational ground improvements and airline operators buffer reductions,
- Passenger gate-to-gate times, specially transit passengers in the context of the 4 hours door-to-door challenge,
- Future passenger compensation regulations uptake, and
- Airline schedule recovery strategies considering passenger connectivity as well as hard and soft passenger costs.

Each flight in the model does not just compute its cost index dynamically, but also computes it in collaboration with the rest of the flights which in turn update their own strategies. In this sense flights under the same operator act as a network, or rather as a system of systems. On top of that, since decisions and proposals are continuously shared and updated between flights sharing passengers, feedback loops appears increasing the complexity of the system. Agent Based Modelling has proven a suitable tool to model these interactions and ultimately reveal some emergent behaviours not expected from the initial strategies. These behaviours cannot be model with other techniques and therefore, to the best of our knowledge, this combination of functionalities far exceeds what any other ATM platform of this kind can realistically model.

The project has focused on two main performance areas, cost and delay, gaining a deep understanding on how those two performance areas relate to each other and are impacted by different operational improvements or traffic conditions. Speed variations and AMAN holding delay have also been found as important indicators of the efficiency of the model. Additionally, other efficiency factors such as emissions can be derived of the results.

Finally, it is worth mentioning that the variety and complexity of the functionalities implemented increased considerably the effort and duration initially allocated. Nevertheless, the scope of the project has not been compromised and the results obtained, as well as the potential for its enhancements and future applications to other scenarios, exceed the initial expectations of the project team.

Cost-related conclusions:

- A direct relationship between the application of ground improvements by reducing airline buffers on ground by 20% and an increase in airline cost has not been proven. Future work should study further reduction of the buffers to identify the optimum buffer for each operation.
- Higher fuel costs leads to less flights deciding to increase the speed. However, the total delay experienced is similar and the passenger costs do not increase.
- Application of cost optimisation strategies would reduce airline cost between 0.5% and 0.7%. This reduction is observed to be obtained by increasing the number of outbound connecting flight performing wait-for-pax and the duration of the waiting time to avoid passengers missing connections. When the amount of passengers claiming compensation increases, the optimised strategy improvement is reduced to 0.2%.
- The initial delay in the system plays an important role on the total cost that airlines experience. The savings in fuel that are observed at the AMAN decrease as the delay increases and the extra costs in fuel and passenger costs increases when the system has higher delay.

Delay related conclusions:

- The average gate-to-gate time for passengers improves marginally when ground improvements are implemented (an average reduction of 0.3% with respect to 2010 traffic trajectories); when adding SESAR improvements, the average gate-to-gate time is reduced in average 4.5% as routes are shortened.
- The application of airline cost optimisation strategy increases gate-to-gate time in average 1.1%. However, it is important to look at the difference between connecting and non-connecting pax. The optimisation strategy increases non-connecting gate-to-gate time by 0.4%; this is due to the increase of wait-for-pax time and translates into a reduction of 0.8% for connecting passengers due to a reduction of passengers missing connections. Results show that aircraft waiting for passengers increase when applying optimisation (aircraft applying wait for pax increase from 1.7% to 6.5%). Also, average waiting time increases from 7 min to 13-14 min (for medium-high delay in optimisation strategy). Outbound flights waiting for passengers benefit from the possibility of applying DCI on their turn.
- Increasing the number of passengers claiming compensation will reduce the amount of passengers missing connections when the aircraft operator costs are optimised (8.5% in medium delay and 15% in high delay)

Efficiency related conclusions

- In nominal conditions (medium delay) with airlines optimising their strategies, the increment in fuel cost will make airlines fly slower, reducing fuel consumption and emissions by approximately 25%.
- An optimisation that allows speed variations lead to lower emissions (i.e., lower fuel consumptions) than current operations. The main reason for this is that the optimisation is considering the total cost, including fuel consumptions, while in the current operations, even if a few flights recover delay, there is no assessment on the fuel that that recovery will represent. Moreover, in the optimised strategy wait-for-passengers seems to be playing a role as important as speed variations to minimise airline operations costs. The extra cost of fuel due to speed increments lead to small speed increments on the optimised scenarios.
- Higher initial delays lead to lower holding delay but the biggest difference is between current and optimised strategies. In the optimised strategy the delay increases. Part of the reason might be due to speed selected to save fuel at the AMAN phase in the optimised strategy. This might be the reason behind why not extra delay is saved on the optimised strategy. In the modelling of current operations, the first slot available is assigned to the arriving flights regardless of the potential fuel usage.

# 10 References

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# Appendix A Indicators

| | Indicator | Units | Description |
|---|---|---|---|
| 1 | idsimulation | - | Code of the simulation where the flight was simulated |
| 2 | FltNum | - | Flight code (AO_ADESADEP_XX) |
| 3 | AIRCRAFT OPERATOR | - | Aircraft operator code |
| 4 | AO TYPE | - | Aircraft operator type (FSC, REG, LCC, CHT) |
| 5 | ALLIANCE | - | Alliance code (sky, one, star) |
| 6 | ADEP | - | Airport Departure ICAO code |
| 7 | ADES | - | Airport Destination ICAO code |
| 8 | CORR REGISTRATION | - | |
| 9 | AIRCRAFT TYPE ICAO ID | - | Aircraft model |
| 10 | WK TBL CAT | H/M/L | |
| 11 | MAX_SEATS | seats | Number of seats for this flight |
| 12 | SOBT | datetime | Scheduled OF BLOCK time |
| 13 | INPUT_DELAY_UNCERT1 | min | Sum of TD + icdtd(d+rand(-0.2,0.2)) |
| 14 | INPUT_DELAY_UNCERT2 | min | Sum of TD + FU |
| 15 | INPUT_DELAY | min | Input delay using burr distribution, TD |
| 16 | PREVIOUS FLTNUM | - | Previous flight code |
| 17 | PREVIOUS AIBT | datetime | Previous flight arrival |
| 18 | MTT | min | Minimum turnaround time used in flight initialization |
| 19 | PREV_DELAY | min | Delay considered for wait for available aircraft |
| 20 | WAIT_DELAY0 | min | Last proposed wait time for outbound flights before flight leg start |
| 21 | WAIT_DELAY1 | min | Wait time selected to wait for connecting pax |
| 22 | EOBT | datetime | |
| 23 | OB DELAY | min | ETOT - SOBT |
| 24 | DMAN DELAY | min | Delay from departure airport |
| 25 | AOBT | datetime | |
| 26 | ITOT | datetime | Initial take off time: SOBT + taxi_out_est |
| 27 | TOUT EST | min | Taxi out estimated time |
| 28 | ETOT | datetime | |
| 29 | TOUT TACT | min | Taxi out tactical time |
| 30 | TOUT UNCERT | min | Taxi out uncertainty time |
| 31 | ATOT | datetime | |
| 32 | TOUT delay | min | ATOT - AOBT - TAXI OUT EST |
| 33 | IRCT | datetime | Initial reaching cruise time: SOBT + taxi_out_est + climb_dur |
| 34 | CLIMB DUR | min | Climb time duration |

| | Indicator | Units | Description |
|---|---|---|---|
| 35 | ERCT | datetime | |
| 36 | CLIMB UNCERT | min | Minutes of uncertainty climb dur |
| 37 | ARCT | datetime | |
| 38 | ARCT_ARR_DELAY | min | Arrival delay when reaching TOC |
| 39 | CLIMB DELAY | min | ARCT - ATOT - climb duration |
| 40 | NOM SPEED | kmmin | Nominal speed for flight |
| 41 | MIN SPEED | kmmin | Minimum speed for flight |
| 42 | ECO SPEED | kmmin | Speed for minimum fuel consumption |
| 43 | MAX SPEED | kmmin | Maximum speed for flight |
| 44 | WIND CORR | kmmin | Wind speed correction |
| 45 | CA0 | kmmin | Last proposed speed for outbound flights before flight leg start |
| 46 | CA1 | kmmin | Optimal airspeed for outbounds before EOBT |
| 47 | CA2 | kmmin | Optimal airspeed after ARCT |
| 48 | SPEEDUP | 0/1 | If CA2 is greater than NOM_SPEED |
| 49 | HOLDING_SPEED | kmmin | Speed for holding |
| 50 | CRUISE_DIST_NOM | km | Cruise distance nominal |
| 51 | CRUISE_DIST_SPEEDUP | km | Cruise distance increment when speedup (more than nom speed) |
| 52 | CRUISE_DIST_UNCERT | km | Cruise distance uncertainty to add to cruise distance nominal |
| 53 | CRUISE_DIST_ELAP | km | Cruise distance elapsed until RADT |
| 54 | CRUISE_DIST_REM | km | Cruise distance remaining. Add previous to this value to calculate cruise distance before RADT |
| 55 | CRUISE_DIST_HOLD | km | Cruise distance from RADT to APTI. Add Cruise_dist_elap to this value to calculate cruise distance after RADT |
| 56 | SFC | € | Fuel cost using nominal speed |
| 57 | CFC1 | € | Variation of fuel cost using CA1 speed |
| 58 | CFC2 | € | Variation of fuel cost using CA2 speed |
| 59 | FUEL CONS CFC2 | Kg | Variation of fuel consumption using CA2 speed |
| 60 | MFC | € | Variation of fuel cost using CA2 for CRUISE DIST REM and HODING SPEED for CRUISE DIST HOLD |
| 61 | CNCC1 | € | Optimal non connecting pax costs (SC) for outbounds using CA1 |
| 62 | CNCC2 | € | Optimal non connecting pax costs (SC) using CA2 |
| 63 | CCHC1 | € | Optimal connecting pax hard costs for outbounds using CA1 |
| 64 | CCHC2 | € | Optimal connecting pax hard costs using CA2 |
| 65 | CCSC1 | € | Optimal connecting pax soft costs for outbounds using CA1 |

| | Indicator | Units | Description |
|---|---|---|---|
| 66 | CCSC2 | € | Optimal connecting pax soft costs using CA2 |
| 67 | CCNMC1 | € | Optimal crew and management costs for outbounds using CA1 |
| 68 | CCNMC2 | € | Optimal crew and management costs using CA2 |
| 69 | CPC1 | € | Optimal provision costs in reallocations for outbounds using CA1 |
| 70 | CTC1 | € | Optimal transfer costs in reallocations for outbounds using CA1 |
| 71 | CRSC1 | € | Optimal rescheduled soft costs for outbounds before using CA1 |
| 72 | CCT_NOM | min | Cruise duration using nominal speed |
| 73 | CCT1 | min | Optimal cruise time for outbounds using CA1 |
| 74 | CCT2 | min | Optimal cruise time using CA2 (added uncertainty and speedup) |
| 75 | ACT | min | Actual cruise time |
| 76 | CIBT0 | datetime | Calculated In-Block time using CA0 speed |
| 77 | CIBT1 | datetime | Calculated In-Block time using CA1 speed |
| 78 | CIBT2 | datetime | Calculated In-Block time using CA2 speed |
| 79 | IPTI | datetime | Initial approximation time: SOBT + taxi_out_est + climb_dur + cruise_dur |
| 80 | EPTI | datetime | |
| 81 | RADT | datetime | Time when AMAN negotiation is started |
| 82 | AMAN_EQUAL_CRUISE | 1/0 | True if RADT == ARCT |
| 83 | AMAN Delay | min | Aman delay |
| 84 | APTI | datetime | |
| 85 | IAF delay | min | APTI - ARCT - cruise dur |
| 86 | SDT | min | Descent time duration at nominal speed |
| 87 | ITA | datetime | Initial landing time: SOBT + taxi_out_est + climb_dur + cruise_dur + descent_dur |
| 88 | ETA | datetime | |
| 89 | ADT | min | Descent time duration at CA2 speed |
| 90 | ATA | datetime | |
| 91 | TA delay | min | ATA - APTI - descent dur |
| 92 | TIN EST | min | Taxi in estimated time |
| 93 | IIBT | datetime | Initial landing time: SOBT + taxi_out_est + climb_dur + cruise_dur + descent_dur + taxi_in_est |
| 94 | EIBT | datetime | |
| 95 | TINT TACT | min | Taxi in tactical time |
| 96 | TINT UNCERT | min | Taxi in uncertainty to be added to TINT TACT |
| 97 | AIBT | datetime | |

| | Indicator | Units | Description |
|---|---|---|---|
| 98 | TIN DELAY | min | AIBT - ATA - TIN_EST |
| 99 | SIBT | datetime | Scheduled In Block Time |
| 100 | ARR DELAY FROM IIBT | min | AIBT - IIBT |
| 101 | ARR DELAY FROM SIBT | min | AIBT - SIBT |
| 102 | BUFFER_T_EST | min | IIBT - SIBT |
| 103 | SDUR | min | SIBT - SOBT |
| 104 | ADUR | min | AIBT - AOBT |

Table 29 – Total number of indicators computed per flight per simulation

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 010101 | P1: Gate-to-gate passenger trip time | AVG(minutes) | ALL |
| 010102 | P1: Gate-to-gate passenger trip time | AVG(minutes) | CHT |
| 010103 | P1: Gate-to-gate passenger trip time | AVG(minutes) | FSC |
| 010104 | P1: Gate-to-gate passenger trip time | AVG(minutes) | LCC |
| 010105 | P1: Gate-to-gate passenger trip time | AVG(minutes) | REG |
| 010201 | P1: Gate-to-gate passenger trip time | CONN AVG(minutes) | ALL |
| 010202 | P1: Gate-to-gate passenger trip time | CONN AVG(minutes) | CHT |
| 010203 | P1: Gate-to-gate passenger trip time | CONN AVG(minutes) | FSC |
| 010204 | P1: Gate-to-gate passenger trip time | CONN AVG(minutes) | LCC |
| 010205 | P1: Gate-to-gate passenger trip time | CONN AVG(minutes) | REG |
| 010301 | P1: Gate-to-gate passenger trip time | CONN PERC90(minutes) | ALL |
| 010302 | P1: Gate-to-gate passenger trip time | CONN PERC90(minutes) | CHT |
| 010303 | P1: Gate-to-gate passenger trip time | CONN PERC90(minutes) | FSC |
| 010304 | P1: Gate-to-gate passenger trip time | CONN PERC90(minutes) | LCC |
| 010305 | P1: Gate-to-gate passenger trip time | CONN PERC90(minutes) | REG |
| 010401 | P1: Gate-to-gate passenger trip time | CONN PERC95(minutes) | ALL |
| 010402 | P1: Gate-to-gate passenger trip time | CONN PERC95(minutes) | CHT |
| 010403 | P1: Gate-to-gate passenger trip time | CONN PERC95(minutes) | FSC |
| 010404 | P1: Gate-to-gate passenger trip time | CONN PERC95(minutes) | LCC |
| 010405 | P1: Gate-to-gate passenger trip time | CONN PERC95(minutes) | REG |
| 010501 | P1: Gate-to-gate passenger trip time | CONN SD(minutes) | ALL |
| 010502 | P1: Gate-to-gate passenger trip time | CONN SD(minutes) | CHT |
| 010503 | P1: Gate-to-gate passenger trip time | CONN SD(minutes) | FSC |
| 010504 | P1: Gate-to-gate passenger trip time | CONN SD(minutes) | LCC |
| 010505 | P1: Gate-to-gate passenger trip time | CONN SD(minutes) | REG |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 010601 | P1: Gate-to-gate passenger trip time | NONCONN AVG(minutes) | ALL |
| 010602 | P1: Gate-to-gate passenger trip time | NONCONN AVG(minutes) | CHT |
| 010603 | P1: Gate-to-gate passenger trip time | NONCONN AVG(minutes) | FSC |
| 010604 | P1: Gate-to-gate passenger trip time | NONCONN AVG(minutes) | LCC |
| 010605 | P1: Gate-to-gate passenger trip time | NONCONN AVG(minutes) | REG |
| 010701 | P1: Gate-to-gate passenger trip time | NONCONN PERC90(minutes) | ALL |
| 010702 | P1: Gate-to-gate passenger trip time | NONCONN PERC90(minutes) | CHT |
| 010703 | P1: Gate-to-gate passenger trip time | NONCONN PERC90(minutes) | FSC |
| 010704 | P1: Gate-to-gate passenger trip time | NONCONN PERC90(minutes) | LCC |
| 010705 | P1: Gate-to-gate passenger trip time | NONCONN PERC90(minutes) | REG |
| 010801 | P1: Gate-to-gate passenger trip time | NONCONN PERC95(minutes) | ALL |
| 010802 | P1: Gate-to-gate passenger trip time | NONCONN PERC95(minutes) | CHT |
| 010803 | P1: Gate-to-gate passenger trip time | NONCONN PERC95(minutes) | FSC |
| 010804 | P1: Gate-to-gate passenger trip time | NONCONN PERC95(minutes) | LCC |
| 010805 | P1: Gate-to-gate passenger trip time | NONCONN PERC95(minutes) | REG |
| 010901 | P1: Gate-to-gate passenger trip time | NONCONN SD(minutes) | ALL |
| 010902 | P1: Gate-to-gate passenger trip time | NONCONN SD(minutes) | CHT |
| 010903 | P1: Gate-to-gate passenger trip time | NONCONN SD(minutes) | FSC |
| 010904 | P1: Gate-to-gate passenger trip time | NONCONN SD(minutes) | LCC |
| 010905 | P1: Gate-to-gate passenger trip time | NONCONN SD(minutes) | REG |
| 011001 | P1: Gate-to-gate passenger trip time | PERC90(minutes) | ALL |
| 011002 | P1: Gate-to-gate passenger trip time | PERC90(minutes) | CHT |
| 011003 | P1: Gate-to-gate passenger trip time | PERC90(minutes) | FSC |
| 011004 | P1: Gate-to-gate passenger trip time | PERC90(minutes) | LCC |
| 011005 | P1: Gate-to-gate passenger trip time | PERC90(minutes) | REG |
| 011101 | P1: Gate-to-gate passenger trip time | PERC95(minutes) | ALL |
| 011102 | P1: Gate-to-gate passenger trip time | PERC95(minutes) | CHT |
| 011103 | P1: Gate-to-gate passenger trip time | PERC95(minutes) | FSC |
| 011104 | P1: Gate-to-gate passenger trip time | PERC95(minutes) | LCC |
| 011105 | P1: Gate-to-gate passenger trip time | PERC95(minutes) | REG |
| 011201 | P1: Gate-to-gate passenger trip time | SD(minutes) | ALL |
| 011202 | P1: Gate-to-gate passenger trip time | SD(minutes) | CHT |
| 011203 | P1: Gate-to-gate passenger trip time | SD(minutes) | FSC |
| 011204 | P1: Gate-to-gate passenger trip time | SD(minutes) | LCC |
| 011205 | P1: Gate-to-gate passenger trip time | SD(minutes) | REG |
| 021301 | P4: Missed connections per flight | AVG(passengers) | ALL |
| 021303 | P4: Missed connections per flight | AVG(passengers) | FSC |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 021304 | P4: Missed connections per flight | AVG(passengers) | LCC |
| 021305 | P4: Missed connections per flight | AVG(passengers) | REG |
| 021401 | P4: Missed connections per flight | SD(passengers) | ALL |
| 021403 | P4: Missed connections per flight | SD(passengers) | FSC |
| 021404 | P4: Missed connections per flight | SD(passengers) | LCC |
| 021405 | P4: Missed connections per flight | SD(passengers) | REG |
| 021501 | P4: Missed connections per flight | SUM(passengers) | ALL |
| 021502 | P4: Missed connections per flight | SUM(passengers) | CHT |
| 021503 | P4: Missed connections per flight | SUM(passengers) | FSC |
| 021504 | P4: Missed connections per flight | SUM(passengers) | LCC |
| 021505 | P4: Missed connections per flight | SUM(passengers) | REG |
| 030101 | P5a: Flight departure delay | AVG(minutes) | ALL |
| 030102 | P5a: Flight departure delay | AVG(minutes) | CHT |
| 030103 | P5a: Flight departure delay | AVG(minutes) | FSC |
| 030104 | P5a: Flight departure delay | AVG(minutes) | LCC |
| 030105 | P5a: Flight departure delay | AVG(minutes) | REG |
| 030106 | P5a: Flight departure delay | AVG(minutes) | Inbounds |
| 030107 | P5a: Flight departure delay | AVG(minutes) | Outbounds |
| 031201 | P5a: Flight departure delay | SD(minutes) | ALL |
| 031202 | P5a: Flight departure delay | SD(minutes) | CHT |
| 031203 | P5a: Flight departure delay | SD(minutes) | FSC |
| 031204 | P5a: Flight departure delay | SD(minutes) | LCC |
| 031205 | P5a: Flight departure delay | SD(minutes) | REG |
| 031206 | P5a: Flight departure delay | SD(minutes) | Inbounds |
| 031207 | P5a: Flight departure delay | SD(minutes) | Outbounds |
| 040101 | P5b: Flight arrival delay | AVG(minutes) | ALL |
| 040102 | P5b: Flight arrival delay | AVG(minutes) | CHT |
| 040103 | P5b: Flight arrival delay | AVG(minutes) | FSC |
| 040104 | P5b: Flight arrival delay | AVG(minutes) | LCC |
| 040105 | P5b: Flight arrival delay | AVG(minutes) | REG |
| 040106 | P5b: Flight arrival delay | AVG(minutes) | Inbounds |
| 040107 | P5b: Flight arrival delay | AVG(minutes) | Outbounds |
| 041201 | P5b: Flight arrival delay | SD(minutes) | ALL |
| 041202 | P5b: Flight arrival delay | SD(minutes) | CHT |
| 041203 | P5b: Flight arrival delay | SD(minutes) | FSC |
| 041204 | P5b: Flight arrival delay | SD(minutes) | LCC |
| 041205 | P5b: Flight arrival delay | SD(minutes) | REG |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 041206 | P5b: Flight arrival delay | SD(minutes) | Inbounds |
| 041207 | P5b: Flight arrival delay | SD(minutes) | Outbounds |
| 051601 | P6: Airlines costs | AVG(euros) | ALL |
| 051602 | P6: Airlines costs | AVG(euros) | CHT |
| 051603 | P6: Airlines costs | AVG(euros) | FSC |
| 051604 | P6: Airlines costs | AVG(euros) | LCC |
| 051605 | P6: Airlines costs | AVG(euros) | REG |
| 051701 | P6: Airlines costs | SD(euros) | ALL |
| 051702 | P6: Airlines costs | SD(euros) | CHT |
| 051703 | P6: Airlines costs | SD(euros) | FSC |
| 051704 | P6: Airlines costs | SD(euros) | LCC |
| 051705 | P6: Airlines costs | SD(euros) | REG |
| 061601 | P7: Hub airline costs | AVG(euros) | ALL |
| 061701 | P7: Hub airline costs | SD(euros) | ALL |
| 071601 | P9: Non hub airlines costs | AVG(euros) | ALL |
| 071701 | P9: Non hub airlines costs | SD(euros) | ALL |
| 081801 | P11: Speed variations incurred | AVG(speedup percentage) | ALL |
| 081802 | P11: Speed variations incurred | AVG(speedup percentage) | CHT |
| 081803 | P11: Speed variations incurred | AVG(speedup percentage) | FSC |
| 081804 | P11: Speed variations incurred | AVG(speedup percentage) | LCC |
| 081805 | P11: Speed variations incurred | AVG(speedup percentage) | REG |
| 081901 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP | ALL |
| 081902 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP | CHT |
| 081903 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP | FSC |
| 081904 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP | LCC |
| 081905 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP | REG |
| 082002 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP INBOUND | CHT |
| 082003 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP INBOUND | FSC |
| 082004 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP INBOUND | LCC |
| 082005 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP INBOUND | REG |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 082102 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP OUTBOUND | CHT |
| 082103 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP OUTBOUND | FSC |
| 082104 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP OUTBOUND | LCC |
| 082105 | P11: Speed variations incurred | AVG(speedup percentage) SPEEDUP OUTBOUND | REG |
| 082201 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP | ALL |
| 082202 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP | CHT |
| 082203 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP | FSC |
| 082204 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP | LCC |
| 082205 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP | REG |
| 082302 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP INBOUND | CHT |
| 082303 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP INBOUND | FSC |
| 082304 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP INBOUND | LCC |
| 082305 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP INBOUND | REG |
| 082402 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP OUTBOUND | CHT |
| 082403 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP OUTBOUND | FSC |
| 082404 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP OUTBOUND | LCC |
| 082405 | P11: Speed variations incurred | COUNT(#Flights) SPEEDUP OUTBOUND | REG |
| 082501 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP | ALL |
| 082502 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP | CHT |
| 082503 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP | FSC |
| 082504 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP | LCC |
| 082505 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP | REG |
| 082602 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP INBOUND | CHT |
| 082603 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP INBOUND | FSC |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 082604 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP INBOUND | LCC |
| 082605 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP INBOUND | REG |
| 082702 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP OUTBOUND | CHT |
| 082703 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP OUTBOUND | FSC |
| 082704 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP OUTBOUND | LCC |
| 082705 | P11: Speed variations incurred | PERC(%Speedup flights) SPEEDUP OUTBOUND | REG |
| 082801 | P11: Speed variations incurred | SD(speedup percentage) | ALL |
| 082802 | P11: Speed variations incurred | SD(speedup percentage) | CHT |
| 082803 | P11: Speed variations incurred | SD(speedup percentage) | FSC |
| 082804 | P11: Speed variations incurred | SD(speedup percentage) | LCC |
| 082805 | P11: Speed variations incurred | SD(speedup percentage) | REG |
| 082901 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP | ALL |
| 082902 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP | CHT |
| 082903 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP | FSC |
| 082904 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP | LCC |
| 082905 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP | REG |
| 083002 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP INBOUND | CHT |
| 083003 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP INBOUND | FSC |
| 083004 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP INBOUND | LCC |
| 083005 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP INBOUND | REG |
| 083102 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP OUTBOUND | CHT |
| 083103 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP OUTBOUND | FSC |
| 083104 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP OUTBOUND | LCC |
| 083105 | P11: Speed variations incurred | SD(speedup percentage) SPEEDUP OUTBOUND | REG |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 090101 | P13: Pax delay | AVG(minutes) | ALL |
| 090102 | P13: Pax delay | AVG(minutes) | CHT |
| 090103 | P13: Pax delay | AVG(minutes) | FSC |
| 090104 | P13: Pax delay | AVG(minutes) | LCC |
| 090105 | P13: Pax delay | AVG(minutes) | REG |
| 091201 | P13: Pax delay | SD(minutes) | ALL |
| 091202 | P13: Pax delay | SD(minutes) | CHT |
| 091203 | P13: Pax delay | SD(minutes) | FSC |
| 091204 | P13: Pax delay | SD(minutes) | LCC |
| 091205 | P13: Pax delay | SD(minutes) | REG |
| 103201 | P14: CO2 Emissions | AVG(tons CO2) | ALL |
| 103202 | P14: CO2 Emissions | AVG(tons CO2) | CHT |
| 103203 | P14: CO2 Emissions | AVG(tons CO2) | FSC |
| 103204 | P14: CO2 Emissions | AVG(tons CO2) | LCC |
| 103205 | P14: CO2 Emissions | AVG(tons CO2) | REG |
| 103301 | P14: CO2 Emissions | SD(tons CO2) | ALL |
| 103302 | P14: CO2 Emissions | SD(tons CO2) | CHT |
| 103303 | P14: CO2 Emissions | SD(tons CO2) | FSC |
| 103304 | P14: CO2 Emissions | SD(tons CO2) | LCC |
| 103305 | P14: CO2 Emissions | SD(tons CO2) | REG |
| 110101 | P15: Departure delayed flights (>= 5 min) | AVG(minutes) | ALL |
| 110102 | P15: Departure delayed flights (>= 5 min) | AVG(minutes) | CHT |
| 110103 | P15: Departure delayed flights (>= 5 min) | AVG(minutes) | FSC |
| 110104 | P15: Departure delayed flights (>= 5 min) | AVG(minutes) | LCC |
| 110105 | P15: Departure delayed flights (>= 5 min) | AVG(minutes) | REG |
| 111201 | P15: Departure delayed flights (>= 5 min) | SD(minutes) | ALL |
| 111202 | P15: Departure delayed flights (>= 5 min) | SD(minutes) | CHT |
| 111203 | P15: Departure delayed flights (>= 5 min) | SD(minutes) | FSC |
| 111204 | P15: Departure delayed flights (>= 5 min) | SD(minutes) | LCC |
| 111205 | P15: Departure delayed flights (>= 5 min) | SD(minutes) | REG |
| 113401 | P15: Departure delayed flights (>= 5 min) | COUNT(#Flights) | ALL |
| 113402 | P15: Departure delayed flights (>= 5 min) | COUNT(#Flights) | CHT |
| 113403 | P15: Departure delayed flights (>= 5 min) | COUNT(#Flights) | FSC |
| 113404 | P15: Departure delayed flights (>= 5 min) | COUNT(#Flights) | LCC |
| 113405 | P15: Departure delayed flights (>= 5 min) | COUNT(#Flights) | REG |
| 120101 | P17: Arrival delayed flights (>= 5 min) | AVG(minutes) | ALL |
| 120102 | P17: Arrival delayed flights (>= 5 min) | AVG(minutes) | CHT |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 120103 | P17: Arrival delayed flights (>= 5 min) | AVG(minutes) | FSC |
| 120104 | P17: Arrival delayed flights (>= 5 min) | AVG(minutes) | LCC |
| 120105 | P17: Arrival delayed flights (>= 5 min) | AVG(minutes) | REG |
| 121201 | P17: Arrival delayed flights (>= 5 min) | SD(minutes) | ALL |
| 121202 | P17: Arrival delayed flights (>= 5 min) | SD(minutes) | CHT |
| 121203 | P17: Arrival delayed flights (>= 5 min) | SD(minutes) | FSC |
| 121204 | P17: Arrival delayed flights (>= 5 min) | SD(minutes) | LCC |
| 121205 | P17: Arrival delayed flights (>= 5 min) | SD(minutes) | REG |
| 123401 | P17: Arrival delayed flights (>= 5 min) | COUNT(#Flights) | ALL |
| 123402 | P17: Arrival delayed flights (>= 5 min) | COUNT(#Flights) | CHT |
| 123403 | P17: Arrival delayed flights (>= 5 min) | COUNT(#Flights) | FSC |
| 123404 | P17: Arrival delayed flights (>= 5 min) | COUNT(#Flights) | LCC |
| 123405 | P17: Arrival delayed flights (>= 5 min) | COUNT(#Flights) | REG |
| 130101 | P19: Holding time | AVG(minutes) | ALL |
| 130102 | P19: Holding time | AVG(minutes) | CHT |
| 130103 | P19: Holding time | AVG(minutes) | FSC |
| 130104 | P19: Holding time | AVG(minutes) | LCC |
| 130105 | P19: Holding time | AVG(minutes) | REG |
| 131201 | P19: Holding time | SD(minutes) | ALL |
| 131202 | P19: Holding time | SD(minutes) | CHT |
| 131203 | P19: Holding time | SD(minutes) | FSC |
| 131204 | P19: Holding time | SD(minutes) | LCC |
| 131205 | P19: Holding time | SD(minutes) | REG |
| 143501 | P20: Number of arrival delayed passengers | COUNT(#Passengers) | ALL |
| 153501 | P21: Number of pax overnight stays | COUNT(#Passengers) | ALL |
| 163601 | P22: Extra fuel costs | AMAN AVG(euros) | ALL |
| 163602 | P22: Extra fuel costs | AMAN AVG(euros) | CHT |
| 163603 | P22: Extra fuel costs | AMAN AVG(euros) | FSC |
| 163604 | P22: Extra fuel costs | AMAN AVG(euros) | LCC |
| 163605 | P22: Extra fuel costs | AMAN AVG(euros) | REG |
| 163701 | P22: Extra fuel costs | AMAN SD(euros) | ALL |
| 163702 | P22: Extra fuel costs | AMAN SD(euros) | CHT |
| 163703 | P22: Extra fuel costs | AMAN SD(euros) | FSC |
| 163704 | P22: Extra fuel costs | AMAN SD(euros) | LCC |
| 163705 | P22: Extra fuel costs | AMAN SD(euros) | REG |
| 163801 | P22: Extra fuel costs | CRUISE AVG(euros) | ALL |
| 163802 | P22: Extra fuel costs | CRUISE AVG(euros) | CHT |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 163803 | P22: Extra fuel costs | CRUISE AVG(euros) | FSC |
| 163804 | P22: Extra fuel costs | CRUISE AVG(euros) | LCC |
| 163805 | P22: Extra fuel costs | CRUISE AVG(euros) | REG |
| 163901 | P22: Extra fuel costs | CRUISE SD(euros) | ALL |
| 163902 | P22: Extra fuel costs | CRUISE SD(euros) | CHT |
| 163903 | P22: Extra fuel costs | CRUISE SD(euros) | FSC |
| 163904 | P22: Extra fuel costs | CRUISE SD(euros) | LCC |
| 163905 | P22: Extra fuel costs | CRUISE SD(euros) | REG |
| 171601 | P23: Flight passenger costs (to airline) | AVG(euros) | ALL |
| 171602 | P23: Flight passenger costs (to airline) | AVG(euros) | CHT |
| 171603 | P23: Flight passenger costs (to airline) | AVG(euros) | FSC |
| 171604 | P23: Flight passenger costs (to airline) | AVG(euros) | LCC |
| 171605 | P23: Flight passenger costs (to airline) | AVG(euros) | REG |
| 171701 | P23: Flight passenger costs (to airline) | SD(euros) | ALL |
| 171702 | P23: Flight passenger costs (to airline) | SD(euros) | CHT |
| 171703 | P23: Flight passenger costs (to airline) | SD(euros) | FSC |
| 171704 | P23: Flight passenger costs (to airline) | SD(euros) | LCC |
| 171705 | P23: Flight passenger costs (to airline) | SD(euros) | REG |
| 174001 | P23: Flight passenger costs (to airline) | AVG(euros) PRIMARY | ALL |
| 174002 | P23: Flight passenger costs (to airline) | AVG(euros) PRIMARY | CHT |
| 174003 | P23: Flight passenger costs (to airline) | AVG(euros) PRIMARY | FSC |
| 174004 | P23: Flight passenger costs (to airline) | AVG(euros) PRIMARY | LCC |
| 174005 | P23: Flight passenger costs (to airline) | AVG(euros) PRIMARY | REG |
| 174101 | P23: Flight passenger costs (to airline) | AVG(euros) REACTIONARY | ALL |
| 174102 | P23: Flight passenger costs (to airline) | AVG(euros) REACTIONARY | CHT |
| 174103 | P23: Flight passenger costs (to airline) | AVG(euros) REACTIONARY | FSC |
| 174104 | P23: Flight passenger costs (to airline) | AVG(euros) REACTIONARY | LCC |
| 174105 | P23: Flight passenger costs (to airline) | AVG(euros) REACTIONARY | REG |
| 174201 | P23: Flight passenger costs (to airline) | SD(euros) PRIMARY | ALL |
| 174202 | P23: Flight passenger costs (to airline) | SD(euros) PRIMARY | CHT |
| 174203 | P23: Flight passenger costs (to airline) | SD(euros) PRIMARY | FSC |
| 174204 | P23: Flight passenger costs (to airline) | SD(euros) PRIMARY | LCC |
| 174205 | P23: Flight passenger costs (to airline) | SD(euros) PRIMARY | REG |
| 174301 | P23: Flight passenger costs (to airline) | SD(euros) REACTIONARY | ALL |
| 174302 | P23: Flight passenger costs (to airline) | SD(euros) REACTIONARY | CHT |
| 174303 | P23: Flight passenger costs (to airline) | SD(euros) REACTIONARY | FSC |
| 174304 | P23: Flight passenger costs (to airline) | SD(euros) REACTIONARY | LCC |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 174305 | P23: Flight passenger costs (to airline) | SD(euros) REACTIONARY | REG |
| 184401 | P24: Direct flight cost per minute of delay | RATE(eur/min) | ALL |
| 184402 | P24: Direct flight cost per minute of delay | RATE(eur/min) | CHT |
| 184403 | P24: Direct flight cost per minute of delay | RATE(eur/min) | FSC |
| 184404 | P24: Direct flight cost per minute of delay | RATE(eur/min) | LCC |
| 184405 | P24: Direct flight cost per minute of delay | RATE(eur/min) | REG |
| 190101 | P25: Wait for passenger flights | AVG(minutes) | ALL |
| 190102 | P25: Wait for passenger flights | AVG(minutes) | CHT |
| 190103 | P25: Wait for passenger flights | AVG(minutes) | FSC |
| 190104 | P25: Wait for passenger flights | AVG(minutes) | LCC |
| 190105 | P25: Wait for passenger flights | AVG(minutes) | REG |
| 191201 | P25: Wait for passenger flights | SD(minutes) | ALL |
| 191202 | P25: Wait for passenger flights | SD(minutes) | CHT |
| 191203 | P25: Wait for passenger flights | SD(minutes) | FSC |
| 191204 | P25: Wait for passenger flights | SD(minutes) | LCC |
| 191205 | P25: Wait for passenger flights | SD(minutes) | REG |
| 193402 | P25: Wait for passenger flights | COUNT(#Flights) | CHT |
| 193403 | P25: Wait for passenger flights | COUNT(#Flights) | FSC |
| 193404 | P25: Wait for passenger flights | COUNT(#Flights) | LCC |
| 193405 | P25: Wait for passenger flights | COUNT(#Flights) | REG |
| 194501 | P25: Wait for passenger flights | COUNT(#flights) | ALL |
| 194601 | P25: Wait for passenger flights | COUNT(#Flights) SPEEDUP AT ARCT | ALL |
| 194701 | P25: Wait for passenger flights | COUNT(#Flights) SPEEDUP AT EOBT | ALL |
| 194801 | P25: Wait for passenger flights | PERC(%flights) | ALL |
| 194802 | P25: Wait for passenger flights | PERC(%flights) | CHT |
| 194803 | P25: Wait for passenger flights | PERC(%flights) | FSC |
| 194804 | P25: Wait for passenger flights | PERC(%flights) | LCC |
| 194805 | P25: Wait for passenger flights | PERC(%flights) | REG |
| 194901 | P25: Wait for passenger flights | SUM(minutes) | ALL |
| 194902 | P25: Wait for passenger flights | SUM(minutes) | CHT |
| 194903 | P25: Wait for passenger flights | SUM(minutes) | FSC |
| 194904 | P25: Wait for passenger flights | SUM(minutes) | LCC |
| 194905 | P25: Wait for passenger flights | SUM(minutes) | REG |
| 205001 | P26: Amount of delay recover by speeding up | AVG(minutes) ACTUAL | ALL |
| 205002 | P26: Amount of delay recover by speeding up | AVG(minutes) ACTUAL | CHT |
| 205003 | P26: Amount of delay recover by speeding up | AVG(minutes) ACTUAL | FSC |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 205004 | P26: Amount of delay recover by speeding up | AVG(minutes) ACTUAL | LCC |
| 205005 | P26: Amount of delay recover by speeding up | AVG(minutes) ACTUAL | REG |
| 205101 | P26: Amount of delay recover by speeding up | AVG(minutes) ESTIMATED | ALL |
| 205102 | P26: Amount of delay recover by speeding up | AVG(minutes) ESTIMATED | CHT |
| 205103 | P26: Amount of delay recover by speeding up | AVG(minutes) ESTIMATED | FSC |
| 205104 | P26: Amount of delay recover by speeding up | AVG(minutes) ESTIMATED | LCC |
| 205105 | P26: Amount of delay recover by speeding up | AVG(minutes) ESTIMATED | REG |
| 205201 | P26: Amount of delay recover by speeding up | AVG(minutes) FINAL | ALL |
| 205202 | P26: Amount of delay recover by speeding up | AVG(minutes) FINAL | CHT |
| 205203 | P26: Amount of delay recover by speeding up | AVG(minutes) FINAL | FSC |
| 205204 | P26: Amount of delay recover by speeding up | AVG(minutes) FINAL | LCC |
| 205205 | P26: Amount of delay recover by speeding up | AVG(minutes) FINAL | REG |
| 205301 | P26: Amount of delay recover by speeding up | SD(minutes) ACTUAL | ALL |
| 205302 | P26: Amount of delay recover by speeding up | SD(minutes) ACTUAL | CHT |
| 205303 | P26: Amount of delay recover by speeding up | SD(minutes) ACTUAL | FSC |
| 205304 | P26: Amount of delay recover by speeding up | SD(minutes) ACTUAL | LCC |
| 205305 | P26: Amount of delay recover by speeding up | SD(minutes) ACTUAL | REG |
| 205401 | P26: Amount of delay recover by speeding up | SD(minutes) ESTIMATED | ALL |
| 205402 | P26: Amount of delay recover by speeding up | SD(minutes) ESTIMATED | CHT |
| 205403 | P26: Amount of delay recover by speeding up | SD(minutes) ESTIMATED | FSC |
| 205404 | P26: Amount of delay recover by speeding up | SD(minutes) ESTIMATED | LCC |
| 205405 | P26: Amount of delay recover by speeding up | SD(minutes) ESTIMATED | REG |
| 205501 | P26: Amount of delay recover by speeding up | SD(minutes) FINAL | ALL |
| 205502 | P26: Amount of delay recover by speeding up | SD(minutes) FINAL | CHT |
| 205503 | P26: Amount of delay recover by speeding up | SD(minutes) FINAL | FSC |
| 205504 | P26: Amount of delay recover by speeding up | SD(minutes) FINAL | LCC |
| 205505 | P26: Amount of delay recover by speeding up | SD(minutes) FINAL | REG |
| 205601 | P26: Amount of delay recover by speeding up | SUM(minutes) ACTUAL | ALL |
| 205602 | P26: Amount of delay recover by speeding up | SUM(minutes) ACTUAL | CHT |
| 205603 | P26: Amount of delay recover by speeding up | SUM(minutes) ACTUAL | FSC |
| 205604 | P26: Amount of delay recover by speeding up | SUM(minutes) ACTUAL | LCC |
| 205605 | P26: Amount of delay recover by speeding up | SUM(minutes) ACTUAL | REG |
| 205701 | P26: Amount of delay recover by speeding up | SUM(minutes) ESTIMATED | ALL |
| 205702 | P26: Amount of delay recover by speeding up | SUM(minutes) ESTIMATED | CHT |
| 205703 | P26: Amount of delay recover by speeding up | SUM(minutes) ESTIMATED | FSC |
| 205704 | P26: Amount of delay recover by speeding up | SUM(minutes) ESTIMATED | LCC |
| 205705 | P26: Amount of delay recover by speeding up | SUM(minutes) ESTIMATED | REG |

| ID Code | Indicator | Aggregator | Restrictor |
|---|---|---|---|
| 205801 | P26: Amount of delay recover by speeding up | SUM(minutes) FINAL | ALL |
| 205802 | P26: Amount of delay recover by speeding up | SUM(minutes) FINAL | CHT |
| 205803 | P26: Amount of delay recover by speeding up | SUM(minutes) FINAL | FSC |
| 205804 | P26: Amount of delay recover by speeding up | SUM(minutes) FINAL | LCC |
| 205805 | P26: Amount of delay recover by speeding up | SUM(minutes) FINAL | REG |
| 210101 | P27: Waiting time in connections | AVG(minutes) | ALL |
| 210102 | P27: Waiting time in connections | AVG(minutes) | CHT |
| 210103 | P27: Waiting time in connections | AVG(minutes) | FSC |
| 210104 | P27: Waiting time in connections | AVG(minutes) | LCC |
| 210105 | P27: Waiting time in connections | AVG(minutes) | REG |
| 211201 | P27: Waiting time in connections | SD(minutes) | ALL |
| 211202 | P27: Waiting time in connections | SD(minutes) | CHT |
| 211203 | P27: Waiting time in connections | SD(minutes) | FSC |
| 211204 | P27: Waiting time in connections | SD(minutes) | LCC |
| 211205 | P27: Waiting time in connections | SD(minutes) | REG |
| 214901 | P27: Waiting time in connections | SUM(minutes) | ALL |
| 214902 | P27: Waiting time in connections | SUM(minutes) | CHT |
| 214903 | P27: Waiting time in connections | SUM(minutes) | FSC |
| 214904 | P27: Waiting time in connections | SUM(minutes) | LCC |
| 214905 | P27: Waiting time in connections | SUM(minutes) | REG |

**Table 30 – Performance indicators computed per simulation – aggregator – restrictor**

# Appendix B Hypothesis tests, numeric results

The following tables show the numeric values used for quantifying the hypothesis

### HD1

#### HD1T1

| *ID* | *1112* | *2112* | *3112* |
|---|---|---|---|
| *010101* | 233.96 | 233.26 | 223.41 |
| *011001* | 630.27 | 626.34 | 609.54 |
| *010201* | 521.24 | 519.36 | 501.41 |
| *010301* | 900.49 | 895.06 | 872.30 |
| *010601* | 173.54 | 173.46 | 164.97 |
| *010701* | 475.01 | 475.08 | 466.02 |
| *190101* | 6.96 | 7.51 | 6.85 |
| *194501* | 11.37 | 12.49 | 11.92 |
| *194801* | 1.68 | 1.85 | 1.76 |
| *194901* | 80.34 | 93.91 | 82.27 |
| *210101* | 86.36 | 84.69 | 84.99 |
| *021301* | 1.44 | 1.35 | 1.36 |
| *021501* | 25.63 | 29.65 | 26.96 |

#### HD1T2

| *ID* | *1113* | *2113* | *3113* |
|---|---|---|---|
| *010101* | 233.07 | 232.32 | 222.30 |
| *011001* | 628.63 | 624.52 | 608.64 |
| *010201* | 530.55 | 528.47 | 509.39 |
| *010301* | 908.31 | 903.92 | 879.66 |
| *010601* | 173.41 | 173.43 | 164.88 |
| *010701* | 474.53 | 474.88 | 465.27 |
| *190101* | 7.28 | 7.53 | 7.43 |
| *194501* | 8.36 | 9.50 | 9.18 |
| *194801* | 1.24 | 1.41 | 1.36 |

| | | | |
|---|---|---|---|
| *194901* | 61.16 | 71.89 | 69.95 |
| *210101* | 93.23 | 91.96 | 91.55 |
| *021301* | 1.46 | 1.47 | 1.45 |
| *021501* | 42.88 | 44.34 | 41.94 |

**HD1T3**

| *ID* | *1122* | *2122* | *3122* | *1123* | *2123* | *3123* |
|---|---|---|---|---|---|---|
| *010101* | 236.36 | 235.84 | 225.79 | 235.57 | 235.03 | 225.17 |
| *011001* | 637.53 | 633.59 | 614.84 | 636.70 | 632.66 | 614.43 |
| *010201* | 517.32 | 515.21 | 497.36 | 527.11 | 524.70 | 506.08 |
| *010301* | 899.42 | 897.06 | 872.55 | 908.46 | 905.86 | 879.13 |
| *010601* | 174.28 | 174.23 | 165.71 | 174.09 | 174.10 | 165.47 |
| *010701* | 478.33 | 478.01 | 468.19 | 477.92 | 478.15 | 467.86 |
| *190101* | 12.38 | 13.00 | 12.88 | 14.23 | 14.22 | 14.35 |
| *194501* | 42.02 | 46.04 | 44.48 | 40.08 | 43.02 | 40.86 |
| *194801* | 6.22 | 6.81 | 6.58 | 5.93 | 6.36 | 6.05 |
| *194901* | 521.34 | 599.68 | 573.07 | 568.28 | 611.13 | 585.68 |
| *210101* | 84.85 | 83.83 | 83.61 | 92.17 | 90.29 | 89.31 |
| *021301* | 1.39 | 1.36 | 1.35 | 1.46 | 1.46 | 1.41 |
| *021501* | 21.14 | 22.34 | 20.54 | 36.70 | 35.76 | 32.94 |

**HD1T4**

| *ID* | *1112* | *2112* | *3112* | *1122* | *2122* | *3122* | *1123* | *2113* |
|---|---|---|---|---|---|---|---|---|
| *010101* | 233.96 | 233.26 | 223.41 | 236.36 | 235.84 | 225.79 | 235.57 | 232.32 |
| *011001* | 630.27 | 626.34 | 609.54 | 637.53 | 633.59 | 614.84 | 636.70 | 624.52 |
| *010201* | 521.24 | 519.36 | 501.41 | 517.32 | 515.21 | 497.36 | 527.11 | 528.47 |
| *010301* | 900.49 | 895.06 | 872.30 | 899.42 | 897.06 | 872.55 | 908.46 | 903.92 |
| *010601* | 173.54 | 173.46 | 164.97 | 174.28 | 174.23 | 165.71 | 174.09 | 173.43 |
| *010701* | 475.01 | 475.08 | 466.02 | 478.33 | 478.01 | 468.19 | 477.92 | 474.88 |
| *190101* | 6.96 | 7.51 | 6.85 | 12.38 | 13.00 | 12.88 | 14.23 | 7.53 |
| *194501* | 11.37 | 12.49 | 11.92 | 42.02 | 46.04 | 44.48 | 40.08 | 9.50 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| *194801* | 1.68 | 1.85 | 1.76 | 6.22 | 6.81 | 6.58 | 5.93 | 1.41 |
| *194901* | 80.34 | 93.91 | 82.27 | 521.34 | 599.68 | 573.07 | 568.28 | 71.89 |
| *210101* | 86.36 | 84.69 | 84.99 | 84.85 | 83.83 | 83.61 | 92.17 | 91.96 |
| *021301* | 1.44 | 1.35 | 1.36 | 1.39 | 1.36 | 1.35 | 1.46 | 1.47 |
| *021501* | 25.63 | 29.65 | 26.96 | 21.14 | 22.34 | 20.54 | 36.70 | 44.34 |

**HD1T5**

| *ID* | *1112* | *2112* | *3112* | *1122* | *2122* | *3122* | *1113* | *2113* | *3113* | *1123* | *2123* | *3123* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *010101* | 233.96 | 233.26 | 223.41 | 236.36 | 235.84 | 225.79 | 233.07 | 232.32 | 222.30 | 235.57 | 235.03 | 225.17 |
| *011001* | 630.27 | 626.34 | 609.54 | 637.53 | 633.59 | 614.84 | 628.63 | 624.52 | 608.64 | 636.70 | 632.66 | 614.43 |
| *010201* | 521.24 | 519.36 | 501.41 | 517.32 | 515.21 | 497.36 | 530.55 | 528.47 | 509.39 | 527.11 | 524.70 | 506.08 |
| *010301* | 900.49 | 895.06 | 872.30 | 899.42 | 897.06 | 872.55 | 908.31 | 903.92 | 879.66 | 908.46 | 905.86 | 879.13 |
| *010601* | 173.54 | 173.46 | 164.97 | 174.28 | 174.23 | 165.71 | 173.41 | 173.43 | 164.88 | 174.09 | 174.10 | 165.47 |
| *010701* | 475.01 | 475.08 | 466.02 | 478.33 | 478.01 | 468.19 | 474.53 | 474.88 | 465.27 | 477.92 | 478.15 | 467.86 |
| *190101* | 6.96 | 7.51 | 6.85 | 12.38 | 13.00 | 12.88 | 7.28 | 7.53 | 7.43 | 14.23 | 14.22 | 14.35 |
| *194501* | 11.37 | 12.49 | 11.92 | 42.02 | 46.04 | 44.48 | 8.36 | 9.50 | 9.18 | 40.08 | 43.02 | 40.86 |
| *194801* | 1.68 | 1.85 | 1.76 | 6.22 | 6.81 | 6.58 | 1.24 | 1.41 | 1.36 | 5.93 | 6.36 | 6.05 |
| *194901* | 80.34 | 93.91 | 82.27 | 521.34 | 599.68 | 573.07 | 61.16 | 71.89 | 69.95 | 568.28 | 611.13 | 585.68 |
| *210101* | 86.36 | 84.69 | 84.99 | 84.85 | 83.83 | 83.61 | 93.23 | 91.96 | 91.55 | 92.17 | 90.29 | 89.31 |
| *021301* | 1.44 | 1.35 | 1.36 | 1.39 | 1.36 | 1.35 | 1.46 | 1.47 | 1.45 | 1.46 | 1.46 | 1.41 |
| *021501* | 25.63 | 29.65 | 26.96 | 21.14 | 22.34 | 20.54 | 42.88 | 44.34 | 41.94 | 36.70 | 35.76 | 32.94 |

**HD2**

**HD2T1**

| *ID* | *1112* | *1212* | *1113* | *1213* |
|---|---|---|---|---|
| *081801* | 0.14 | 0.13 | 0.21 | 0.23 |
| *082201* | 14.55 | 13.52 | 23.52 | 24.80 |
| *081901* | 6.55 | 6.21 | 6.13 | 6.33 |
| *090101* | 0.10 | 0.09 | 10.72 | 10.91 |
| *143501* | 23019.69 | 23262.26 | 31345.96 | 31302.90 |
| *210101* | 86.36 | 86.56 | 93.23 | 93.76 |
| *010101* | 233.96 | 233.84 | 233.07 | 233.05 |

| | | | | |
|---|---|---|---|---|
| *011001* | 630.27 | 629.52 | 628.63 | 626.75 |
| *010201* | 521.24 | 520.71 | 530.55 | 530.93 |
| *010301* | 900.49 | 899.61 | 908.31 | 909.79 |
| *010601* | 173.54 | 173.60 | 173.41 | 173.35 |
| *010701* | 475.01 | 475.34 | 474.53 | 474.93 |
| *120101* | 19.84 | 19.63 | 30.91 | 31.24 |

**HD2T3**

| *ID* | *1122* | *1222* | *1123* | *1223* |
|---|---|---|---|---|
| *081801* | 0.38 | 0.23 | 0.69 | 0.45 |
| *082201* | 64.70 | 42.22 | 116.76 | 80.80 |
| *081901* | 3.96 | 3.75 | 4.02 | 3.74 |
| *090101* | 2.67 | 2.80 | 13.54 | 13.31 |
| *143501* | 26280.08 | 26684.30 | 34419.02 | 34400.84 |
| *210101* | 84.85 | 85.12 | 92.17 | 91.08 |
| *010101* | 236.36 | 236.42 | 235.57 | 235.73 |
| *011001* | 637.53 | 635.98 | 636.70 | 637.02 |
| *010201* | 517.32 | 516.77 | 527.11 | 526.44 |
| *010301* | 899.42 | 899.14 | 908.46 | 906.51 |
| *010601* | 174.28 | 174.48 | 174.09 | 174.27 |
| *010701* | 478.33 | 478.22 | 477.92 | 477.94 |
| *120101* | 20.01 | 19.99 | 31.34 | 30.97 |

**HD2T4**

| *ID* | *3122* | *3222* | *3123* | *3223* |
|---|---|---|---|---|
| *081801* | 0.39 | 0.23 | 0.66 | 0.46 |
| *082201* | 62.14 | 37.80 | 105.62 | 75.56 |
| *081901* | 4.25 | 4.15 | 4.25 | 4.15 |
| *090101* | 2.81 | 2.88 | 12.55 | 13.62 |
| *143501* | 26698.28 | 26458.18 | 33714.90 | 34251.02 |
| *210101* | 83.61 | 83.58 | 89.31 | 90.23 |

| | | | | |
|---|---|---|---|---|
| *010101* | 225.79 | 225.81 | 225.17 | 225.41 |
| *011001* | 614.84 | 613.88 | 614.43 | 615.85 |
| *010201* | 497.36 | 496.95 | 506.08 | 507.28 |
| *010301* | 872.55 | 873.62 | 879.13 | 881.99 |
| *010601* | 165.71 | 165.77 | 165.47 | 165.77 |
| *010701* | 468.19 | 468.47 | 467.86 | 468.87 |
| *120101* | 20.01 | 20.10 | 30.24 | 31.16 |

**HD3**

**HD3T1**

| *ID* | *1112* | *1122* | *1113* | *1123* |
|---|---|---|---|---|
| *090101* | 0.10 | 2.67 | 10.72 | 13.54 |
| *010101* | 233.96 | 236.36 | 233.07 | 235.57 |
| *011001* | 630.27 | 637.53 | 628.63 | 636.70 |
| *010201* | 521.24 | 517.32 | 530.55 | 527.11 |
| *010301* | 900.49 | 899.42 | 908.31 | 908.46 |
| *010601* | 173.54 | 174.28 | 173.41 | 174.09 |
| *010701* | 475.01 | 478.33 | 474.53 | 477.92 |
| *010103* | 273.27 | 275.88 | 272.55 | 275.23 |
| *010104* | 104.22 | 104.52 | 104.15 | 104.58 |
| *011003* | 688.20 | 690.83 | 688.24 | 690.26 |
| *011004* | 154.17 | 154.18 | 154.18 | 154.53 |
| *010203* | 521.50 | 517.96 | 530.95 | 527.71 |
| *010204* | 595.95 | 590.76 | 597.85 | 599.90 |
| *010303* | 899.64 | 899.01 | 907.30 | 907.85 |
| *010304* | 990.09 | 989.60 | 983.86 | 996.73 |
| *010603* | 200.34 | 201.26 | 200.21 | 200.99 |
| *010604* | 103.06 | 103.37 | 102.99 | 103.41 |
| *010703* | 498.93 | 499.45 | 498.75 | 499.79 |
| *010704* | 152.81 | 154.08 | 152.92 | 154.22 |

### HD3T2

| ID | 2112 | 2122 | 3112 | 3122 |
|---|---|---|---|---|
| 090101 | 0.13 | 2.98 | 0.11 | 2.81 |
| 010101 | 233.26 | 235.84 | 223.41 | 225.79 |
| 011001 | 626.34 | 633.59 | 609.54 | 614.84 |
| 010201 | 519.36 | 515.21 | 501.41 | 497.36 |
| 010301 | 895.06 | 897.06 | 872.30 | 872.55 |
| 010601 | 173.46 | 174.23 | 164.97 | 165.71 |
| 010701 | 475.08 | 478.01 | 466.02 | 468.19 |
| 010103 | 272.45 | 275.22 | 262.09 | 264.63 |
| 010104 | 104.06 | 104.33 | 95.50 | 95.96 |
| 011003 | 687.23 | 690.26 | 669.78 | 672.31 |
| 011004 | 155.18 | 153.59 | 147.18 | 148.80 |
| 010203 | 519.50 | 515.82 | 501.43 | 497.86 |
| 010204 | 598.50 | 593.67 | 579.80 | 571.39 |
| 010303 | 894.05 | 896.49 | 871.66 | 872.03 |
| 010304 | 985.40 | 989.70 | 957.11 | 954.03 |
| 010603 | 200.30 | 201.23 | 191.75 | 192.65 |
| 010604 | 102.92 | 103.18 | 94.39 | 94.84 |
| 010703 | 498.59 | 499.70 | 484.68 | 484.92 |
| 010704 | 153.94 | 153.27 | 145.95 | 148.22 |

## HD4

### HD4T1

| ID | 1122 | 1132 | 1123 | 1133 |
|---|---|---|---|---|
| 010101 | 236.36 | 236.89 | 235.57 | 236.55 |
| 011001 | 637.53 | 637.07 | 636.70 | 639.76 |
| 010201 | 517.32 | 516.74 | 527.11 | 526.25 |
| 010301 | 899.42 | 899.82 | 908.46 | 908.53 |
| 010601 | 174.28 | 174.42 | 174.09 | 174.25 |

| | | | | |
|---|---|---|---|---|
| *010701* | 478.33 | 477.88 | 477.92 | 477.77 |
| *021301* | 1.39 | 1.44 | 1.46 | 1.40 |
| *021501* | 21.14 | 19.34 | 36.70 | 31.24 |

**HD4T2**

| *ID* | *2122* | *2132* | *2123* | *2133* | *3122* | *3132* | *3123* | *3133* |
|---|---|---|---|---|---|---|---|---|
| *010101* | 235.84 | 236.42 | 235.03 | 235.98 | 225.79 | 226.44 | 225.17 | 226.29 |
| *011001* | 633.59 | 635.00 | 632.66 | 635.44 | 614.84 | 616.70 | 614.43 | 617.19 |
| *010201* | 515.21 | 515.88 | 524.70 | 525.47 | 497.36 | 498.73 | 506.08 | 506.65 |
| *010301* | 897.06 | 897.45 | 905.86 | 907.96 | 872.55 | 874.32 | 879.13 | 881.59 |
| *010601* | 174.23 | 174.42 | 174.10 | 174.25 | 165.71 | 165.78 | 165.47 | 165.71 |
| *010701* | 478.01 | 478.27 | 478.15 | 478.23 | 468.19 | 468.12 | 467.86 | 468.08 |
| *021301* | 1.36 | 1.38 | 1.46 | 1.47 | 1.35 | 1.37 | 1.41 | 1.37 |
| *021501* | 22.34 | 21.26 | 35.76 | 35.52 | 20.54 | 18.74 | 32.94 | 30.98 |

**HD5**

**HD5T1**

| *ID* | *1122* | *3122* |
|---|---|---|
| *110101* | 17.62 | 17.57 |
| *120101* | 20.01 | 20.01 |
| *205101* | 2.20 | 2.05 |
| *205201* | -2.07 | -2.05 |
| *205001* | 1.61 | 1.78 |
| *081801* | 0.38 | 0.39 |

**HC1**

**HC1T1**

| *ID* | *1111* | *2111* | *3111* | *1112* | *2112* | *3112* | *1113* | *2113* | *3113* |
|---|---|---|---|---|---|---|---|---|---|
| *051601* | 4788.46 | 4793.01 | 4427.94 | 4833.16 | 4834.35 | 4465.25 | 5010.06 | 5015.75 | 4635.35 |
| *061601* | 5677.47 | 5684.48 | 5342.89 | 5724.38 | 5730.51 | 5383.26 | 5905.31 | 5914.96 | 5559.31 |
| *071601* | 3805.29 | 3807.10 | 3416.09 | 3847.54 | 3843.28 | 3450.01 | 4020.00 | 4021.29 | 3613.53 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| *163601* | 8.56 | 10.06 | 12.60 | 9.52 | 8.43 | 12.37 | 7.24 | 8.33 | 10.81 |
| *163801* | 2.50 | 3.51 | 3.27 | 5.44 | 4.52 | 5.48 | 9.09 | 10.02 | 8.73 |
| *171601* | 38.33 | 41.59 | 39.80 | 59.14 | 62.68 | 58.84 | 161.62 | 165.28 | 155.67 |
| *174001* | 8.75 | 8.72 | 8.78 | 21.73 | 20.31 | 19.36 | 104.88 | 104.85 | 97.18 |
| *174101* | 30.23 | 33.61 | 31.73 | 38.65 | 43.81 | 41.00 | 60.90 | 64.77 | 62.79 |
| *184401* | 1869.92 | 1117.10 | 1092.92 | 2272.43 | 1063.78 | 746.33 | 779.51 | 2001.18 | 738.11 |
| *040101* | -1.37 | -1.21 | -1.25 | 2.32 | 2.45 | 2.21 | 12.70 | 12.98 | 12.24 |
| *120101* | 16.16 | 16.24 | 16.28 | 19.84 | 19.88 | 19.55 | 30.91 | 31.17 | 30.35 |

**HC2**

**HC2T1**

| *ID* | *1122* | *1222* | *3122* | *3222* | *3132* | *3232* |
|---|---|---|---|---|---|---|
| *051601* | 4796.23 | 5696.26 | 4431.60 | 5263.52 | 4456.48 | 5286.94 |
| *081801* | 0.38 | 0.23 | 0.39 | 0.23 | 0.50 | 0.38 |
| *081901* | 3.96 | 3.75 | 4.25 | 4.15 | 4.25 | 4.33 |
| *082201* | 64.70 | 42.22 | 62.14 | 37.80 | 79.20 | 59.30 |
| *184401* | 1123.11 | 1409.42 | 1812.93 | 1286.18 | 1004.99 | 1178.04 |
| *171601* | 35.58 | 36.46 | 36.16 | 36.80 | 49.14 | 48.03 |
| *120101* | 20.01 | 19.99 | 20.01 | 20.10 | 20.91 | 20.62 |

**HC3 - Data for analysis**

**HC3T1**

| *ID* | *1112* | *1122* | *1132* | *1113* | *1123* | *1133* |
|---|---|---|---|---|---|---|
| *051601* | 4833.16 | 4796.23 | 4816.69 | 5010.06 | 4984.59 | 5055.29 |
| *171601* | 59.14 | 35.58 | 45.81 | 161.62 | 144.66 | 199.89 |
| *174001* | 21.73 | 21.57 | 21.83 | 104.88 | 109.47 | 132.52 |
| *174101* | 38.65 | 15.24 | 25.20 | 60.90 | 38.77 | 72.05 |

### HC3T2

| *ID* | *3112* | *3122* | *3132* | *3113* | *3123* | *3133* |
|---|---|---|---|---|---|---|
| *051601* | 4465.25 | 4431.60 | 4456.48 | 4635.35 | 4596.29 | 4655.46 |
| *171601* | 58.84 | 36.16 | 49.14 | 155.67 | 130.26 | 174.45 |
| *174001* | 19.36 | 21.89 | 25.25 | 97.18 | 99.02 | 118.43 |
| *174101* | 41.00 | 15.50 | 25.19 | 62.79 | 35.10 | 62.18 |

### HC4 - Data for analysis

### HC4T1

| *ID* | *1122* | *1222* | *2122* | *2222* | *3122* | *3222* |
|---|---|---|---|---|---|---|
| *051601* | 4796.23 | 5696.26 | 4799.06 | 5698.39 | 4431.60 | 5263.52 |
| *163601* | -11.20 | -21.53 | -11.44 | -21.06 | -8.25 | -15.46 |
| *163801* | 3.67 | 3.46 | 3.79 | 3.55 | 2.72 | 2.04 |
| *171601* | 35.58 | 36.46 | 38.76 | 36.90 | 36.16 | 36.80 |
| *174001* | 21.57 | 22.37 | 22.83 | 21.08 | 21.89 | 22.80 |
| *174101* | 15.24 | 15.44 | 17.26 | 17.04 | 15.50 | 15.39 |

### HC4T2

| *ID* | *1121* | *1122* | *1123* | *2121* | *2122* | *2123* | *3121* | *3122* | *3123* |
|---|---|---|---|---|---|---|---|---|---|
| *051601* | 4754.46 | 4796.23 | 4984.59 | 4757.65 | 4799.06 | 4985.55 | 4391.50 | 4431.60 | 4596.29 |
| *163601* | -12.11 | -11.20 | -10.68 | -11.15 | -11.44 | -9.43 | -8.87 | -8.25 | -7.23 |
| *163801* | 2.10 | 3.67 | 7.92 | 2.34 | 3.79 | 8.27 | 1.31 | 2.72 | 6.02 |
| *171601* | 19.11 | 35.58 | 144.66 | 20.59 | 38.76 | 146.12 | 19.43 | 36.16 | 130.26 |
| *174001* | 9.82 | 21.57 | 109.47 | 9.77 | 22.83 | 109.88 | 10.38 | 21.89 | 99.02 |
| *174101* | 9.85 | 15.24 | 38.77 | 11.46 | 17.26 | 40.33 | 9.70 | 15.50 | |

### HE1 - Data for analysis

### HE1T1

| *ID* | *1122* | *1222* | *2122* | *2222* | *3122* | *3222* |
|---|---|---|---|---|---|---|
| *103201* | 29250.98 | 21823.37 | 29252.74 | 21823.50 | 26958.19 | 20119.88 |
| *082201* | 64.70 | 42.22 | 66.12 | 43.16 | 62.14 | 37.80 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *082501* | 9.57 | 6.25 | 9.78 | 6.38 | 9.19 | 5.59 |

**HE2 - Data for analysis**

**HE2T1**

| *ID* | *1112* | *1122* | *1132* | *3112* | *3122* | *3132* |
|---|---|---|---|---|---|---|
| *103201* | 29396.64 | 29250.98 | 29284.96 | 27089.80 | 26958.19 | 26986.11 |

**HE3 - Data for analysis**

**HE3T1**

| *ID* | *1111* | *1112* | *1113* | *1121* | *1122* | *1123* | *3111* | *3112* | *3113* | *3121* | *3122* | *3123* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *130101* | 0.69 | 0.60 | 0.41 | 1.40 | 1.36 | 1.23 | 0.93 | 0.86 | 0.71 | 1.58 | 1.53 | 1.45 |
| *163601* | 8.56 | 9.52 | 7.24 | -12.11 | -11.20 | -10.68 | 12.60 | 12.37 | 10.81 | -8.87 | -8.25 | -7.23 |

# Appendix C Normality tests

A common assumption on data required by many statistical tools, like the confidence interval formulas used in this project, is normality on the data. This annex contains the results of a Chi Square goodness of fit test to reject the following Null hypothesis:

"Data follows a Normal distribution with unknown parameters"

The table shows the p-values. For instance for a confidence of 95% one should interpret the tables as follows:

- If $p<0.05$ the Null hypothesis is rejected i.e. data doesn't follow a normal distribution.
- Otherwise, the Null hypothesis is not rejected, i.e. the test can't say that the data doesn't follow a normal distribution.
- n/d - not enough data or test failed, e.g. badly distributed samples

Being the Chi Square a one side test, not rejecting the Null hypothesis doesn't necessarily mean that the data DOES follow a Normal distribution, but rather the test says that if is unlikely that the data doesn’t follow a normal distribution, however this probability is unknown. Nevertheless, if the p-value is large enough (e.g. close to 1.00) it may be most likely that the data follows a Normal distribution, but again there is no formal statement or proof of this assumption.

| ID | 1113 | 1122 | 1123 | 1212 | 1213 | 1222 | 1223 | 3112 | 3113 | 3122 | 3123 | 3212 | 3213 | 3222 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **010101** | 0.70 | 0.97 | 0.05 | 0.79 | 0.42 | 0.31 | 0.26 | 0.77 | 0.31 | 0.26 | 0.70 | 0.03 | 0.43 | 0.26 |
| **010102** | 0.44 | 0.55 | 0.06 | 0.02 | 0.24 | 0.18 | 0.45 | 0.91 | 0.21 | 0.80 | 0.47 | 0.43 | 0.91 | 0.66 |
| **010103** | 0.54 | 0.53 | 0.18 | 0.14 | 0.41 | 0.93 | 0.73 | 0.06 | 0.59 | 0.50 | 0.75 | 0.65 | 0.64 | 0.23 |
| **010104** | 0.61 | 0.41 | 0.75 | 0.38 | 0.14 | 0.42 | 0.86 | 0.17 | 0.38 | 0.20 | 0.84 | 0.45 | 0.01 | 0.53 |
| **010105** | 0.59 | 0.89 | 0.13 | 0.78 | 0.06 | 0.33 | 0.84 | 0.30 | 0.23 | 0.90 | 0.38 | 0.86 | 0.70 | 0.98 |
| **010201** | 0.55 | 0.39 | 0.30 | 0.87 | 0.11 | 0.81 | 0.78 | 0.13 | 0.81 | 0.73 | 0.67 | 0.81 | 0.13 | 0.40 |
| **010202** | 0.26 | 0.51 | 0.33 | 0.00 | 0.00 | 0.20 | 0.01 | 0.19 | 0.17 | 0.07 | 0.12 | 0.09 | 0.12 | 0.27 |
| **010203** | 0.48 | 0.40 | 0.08 | 0.99 | 0.07 | 0.90 | 0.81 | 0.21 | 0.56 | 0.70 | 0.60 | 0.27 | 0.20 | 0.85 |
| **010204** | 0.48 | 0.36 | 0.11 | 0.57 | 0.79 | 0.01 | 0.58 | 0.33 | 0.70 | 0.04 | 0.05 | 0.35 | 0.09 | 0.17 |
| **010205** | 0.43 | 0.12 | 0.01 | 0.09 | 0.53 | 0.31 | 0.21 | 0.71 | 0.45 | 0.26 | 0.05 | 0.90 | 0.65 | 0.35 |
| **010301** | 0.44 | 0.07 | 0.53 | 0.70 | 0.38 | 0.62 | 0.28 | 0.93 | 0.87 | 0.82 | 0.20 | 0.69 | 0.41 | 0.02 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 010302 | 0.52 | 0.22 | 0.19 | 0.33 | 0.01 | 0.05 | 0.39 | 0.53 | 0.00 | 0.61 | 0.01 | 0.20 | 0.03 | 0.15 |
| 010303 | 0.51 | 0.06 | 0.70 | 0.83 | 0.25 | 0.17 | 0.88 | 0.58 | 0.97 | 0.76 | 0.36 | 0.62 | 0.25 | 0.59 |
| 010304 | 0.12 | 0.21 | 0.93 | 0.63 | 0.28 | 0.76 | 0.04 | 0.60 | 0.02 | 0.05 | 0.01 | 0.16 | 0.01 | 0.14 |
| 010305 | 0.11 | 0.40 | 0.21 | 0.13 | 0.51 | 0.06 | 0.13 | 0.67 | 0.00 | 0.94 | 0.80 | 0.66 | 0.01 | 0.00 |
| 010401 | 0.08 | 0.65 | 0.30 | 0.24 | 0.17 | 0.39 | 0.39 | 0.06 | 0.45 | 0.57 | 0.30 | 0.83 | 0.30 | 0.66 |
| 010402 | 0.05 | 0.29 | 0.02 | 0.09 | 0.36 | 0.03 | 0.09 | 0.06 | 0.02 | 0.02 | 0.00 | 0.02 | 0.04 | 0.27 |
| 010403 | 0.37 | 0.51 | 0.43 | 0.60 | 0.08 | 0.62 | 0.69 | 0.69 | 0.21 | 0.21 | 0.04 | 0.64 | 0.02 | 0.28 |
| 010404 | 0.23 | 0.42 | 0.15 | 0.14 | 0.02 | 0.04 | 0.03 | 0.11 | 0.01 | 0.05 | 0.00 | 0.57 | 0.07 | 0.38 |
| 010405 | 0.89 | 0.26 | 0.19 | 0.58 | 0.01 | 0.91 | 0.39 | 0.41 | 0.16 | 0.15 | 0.00 | 0.38 | 0.01 | 0.18 |
| 010501 | 0.19 | 0.65 | 0.14 | 0.04 | 0.08 | 0.47 | 0.02 | 0.64 | 0.86 | 0.03 | 0.44 | 0.91 | 0.86 | 0.78 |
| 010502 | 0.37 | 0.65 | 0.26 | 0.27 | 0.10 | 0.63 | 0.86 | 0.32 | 0.22 | 0.08 | 0.75 | 0.15 | 0.01 | 0.19 |
| 010503 | 0.11 | 0.69 | 0.04 | 0.04 | 0.09 | 0.74 | 0.10 | 0.88 | 0.06 | 0.03 | 0.22 | 0.65 | 0.82 | 0.63 |
| 010504 | 0.08 | 0.43 | 0.79 | 0.23 | 0.59 | 0.14 | 0.03 | 0.27 | 0.60 | 0.85 | 0.69 | 0.13 | 0.36 | 0.57 |
| 010505 | 0.08 | 0.60 | 0.22 | 0.76 | 0.40 | 0.44 | 0.36 | 0.17 | 0.10 | 0.15 | 0.71 | 0.36 | 0.21 | 0.50 |
| 010601 | 0.76 | 0.90 | 0.19 | 0.95 | 0.27 | 0.45 | 0.79 | 0.58 | 0.74 | 0.47 | 0.60 | 0.12 | 0.01 | 0.35 |
| 010602 | 0.38 | 0.22 | 0.05 | 0.17 | 0.24 | 0.25 | 0.53 | 0.17 | 0.41 | 0.22 | 0.00 | 0.24 | 0.17 | 0.33 |
| 010603 | 0.14 | 0.23 | 0.54 | 0.32 | 0.89 | 0.92 | 0.72 | 0.88 | 0.18 | 0.20 | 0.53 | 0.46 | 0.75 | 0.39 |
| 010604 | 0.13 | 0.96 | 0.23 | 0.24 | 0.62 | 0.36 | 0.32 | 0.02 | 0.90 | 0.22 | 0.64 | 0.21 | 0.07 | 0.64 |
| 010605 | 0.69 | 0.56 | 0.72 | 0.99 | 0.25 | 0.48 | 0.81 | 0.34 | 0.96 | 0.78 | 0.74 | 0.24 | 0.02 | 0.21 |

| ID | 1113 | 1122 | 1123 | 1212 | 1213 | 1222 | 1223 | 3112 | 3113 | 3122 | 3123 | 3212 | 3213 | 3222 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **010701** | 0.49 | 0.34 | 0.86 | 0.35 | 0.44 | 0.84 | 0.52 | 0.77 | 0.05 | 0.40 | 0.37 | 0.14 | 0.18 | 0.95 |
| **010702** | 0.82 | 0.40 | 0.45 | 0.38 | 0.36 | 0.05 | 0.28 | 0.48 | 0.16 | 0.14 | 0.56 | 0.17 | 0.24 | 0.81 |
| **010703** | 0.15 | 0.47 | 0.22 | 0.51 | 0.38 | 0.62 | 0.30 | 0.55 | 0.16 | 0.57 | 0.49 | 0.33 | 0.85 | 0.18 |
| **010704** | 0.61 | 0.20 | 0.97 | 0.16 | 0.80 | 0.54 | 0.88 | 0.15 | 0.09 | 0.57 | 0.45 | 0.59 | 0.59 | 0.54 |
| **010705** | 0.50 | 0.46 | 0.38 | 0.07 | 0.74 | 0.49 | 0.18 | 0.09 | 0.10 | 0.12 | 0.49 | 0.69 | 0.18 | 0.82 |
| **010801** | 0.54 | 0.24 | 0.31 | 0.37 | 0.05 | 0.56 | 0.02 | 0.12 | 0.39 | 0.73 | 0.06 | 0.22 | 0.17 | 0.18 |
| **010802** | 0.84 | 0.27 | 0.70 | 0.30 | 0.31 | 0.45 | 0.63 | 0.47 | 0.66 | 0.06 | 0.54 | 0.74 | 0.01 | 0.13 |
| **010803** | 0.31 | 0.53 | 0.27 | 0.61 | 0.19 | 0.48 | 0.49 | 0.10 | 0.70 | 0.61 | 0.46 | 0.22 | 0.44 | 0.15 |
| **010804** | 0.27 | 0.27 | 0.23 | 0.21 | 0.53 | 0.47 | 0.10 | 0.39 | 0.24 | 0.68 | 0.30 | 0.15 | 0.66 | 0.03 |
| **010805** | 0.28 | 0.06 | 0.89 | 0.70 | 0.12 | 0.65 | 0.78 | 0.06 | 0.16 | 0.07 | 0.96 | 0.52 | 0.03 | 0.06 |
| **010901** | 0.01 | 0.02 | 0.51 | 0.57 | 0.27 | 0.16 | 0.35 | 0.79 | 0.32 | 0.01 | 0.41 | 0.05 | 0.39 | 0.27 |
| **010902** | 0.23 | 0.50 | 0.59 | 0.40 | 0.50 | 0.90 | 0.66 | 0.45 | 0.18 | 0.14 | 0.77 | 0.43 | 0.05 | 0.15 |
| **010903** | 0.52 | 0.37 | 0.32 | 0.08 | 0.36 | 0.70 | 0.18 | 0.09 | 0.40 | 0.01 | 0.73 | 0.18 | 0.61 | 0.74 |
| **010904** | 0.15 | 0.01 | 0.35 | 0.77 | 0.14 | 0.10 | 1.00 | 0.13 | 0.44 | 0.69 | 0.37 | 0.28 | 0.48 | 0.79 |
| **010905** | 0.39 | 0.11 | 0.03 | 0.92 | 0.12 | 0.27 | 0.77 | 0.70 | 0.51 | 0.38 | 0.47 | 0.77 | 0.44 | 0.92 |
| **011001** | 0.28 | 0.14 | 0.38 | 0.54 | 0.26 | 0.05 | 0.47 | 0.49 | 0.21 | 0.17 | 0.50 | 0.31 | 0.39 | 0.03 |
| **011002** | 0.66 | 0.55 | 0.88 | 0.64 | 0.26 | 0.97 | 0.14 | 0.01 | 0.60 | 0.12 | 0.25 | 0.16 | 0.26 | 0.66 |
| **011003** | 0.49 | 0.71 | 0.49 | 0.15 | 0.57 | 0.32 | 0.63 | 0.46 | 0.15 | 0.23 | 0.27 | 0.43 | 0.45 | 0.97 |
| **011004** | 0.60 | 0.06 | 0.70 | 0.15 | 0.26 | 0.52 | 0.66 | 0.51 | 0.46 | 0.38 | 0.02 | 0.31 | 0.60 | 0.74 |

| ID | 1113 | 1122 | 1123 | 1212 | 1213 | 1222 | 1223 | 3112 | 3113 | 3122 | 3123 | 3212 | 3213 | 3222 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **011005** | 0.00 | 0.00 | 0.05 | 0.05 | 0.52 | 0.19 | 0.00 | 0.67 | 0.66 | 0.41 | 0.00 | 0.09 | 0.02 | 0.09 |
| **011101** | 0.30 | 0.04 | 0.63 | 0.39 | 0.58 | 0.33 | 0.85 | 0.36 | 0.81 | 0.27 | 0.52 | 0.90 | 0.28 | 0.17 |
| **011102** | 0.84 | 0.27 | 0.70 | 0.30 | 0.31 | 0.45 | 0.63 | 0.47 | 0.66 | 0.06 | 0.54 | 0.74 | 0.01 | 0.13 |
| **011103** | 0.04 | 0.62 | 0.17 | 0.44 | 0.38 | 0.12 | 0.56 | 0.81 | 0.04 | 0.04 | 0.93 | 0.06 | 0.30 | 0.14 |
| **011104** | 0.56 | 0.71 | 0.32 | 0.07 | 0.71 | 0.43 | 0.40 | 0.13 | 0.46 | 0.85 | 0.52 | 0.01 | 0.53 | 0.02 |
| **011105** | 0.00 | 0.08 | 0.10 | 0.01 | 0.38 | 0.93 | 0.42 | 0.56 | 0.43 | 0.50 | 0.01 | 0.79 | 0.44 | 0.61 |
| **011201** | 0.63 | 0.43 | 0.09 | 0.14 | 0.09 | 0.02 | 0.31 | 0.26 | 0.21 | 0.48 | 0.09 | 0.64 | 0.60 | 0.27 |
| **011202** | 0.30 | 0.81 | 0.87 | 0.02 | 0.10 | 0.32 | 0.11 | 0.41 | 0.82 | 0.64 | 0.14 | 0.07 | 0.70 | 0.33 |
| **011203** | 0.35 | 0.60 | 0.00 | 0.30 | 0.12 | 0.03 | 0.73 | 0.70 | 0.12 | 0.08 | 0.12 | 0.14 | 0.11 | 0.03 |
| **011204** | 0.11 | 0.04 | 0.38 | 0.26 | 0.55 | 0.01 | 0.04 | 0.52 | 0.68 | 0.89 | 0.22 | 0.19 | 0.13 | 0.11 |
| **011205** | 0.06 | 0.01 | 0.22 | 0.08 | 0.18 | 0.41 | 0.49 | 0.29 | 0.91 | 0.04 | 0.12 | 0.02 | 0.55 | 0.28 |
| **021301** | 0.20 | 0.51 | 0.05 | 0.65 | 0.29 | 0.28 | 0.67 | 0.19 | 0.59 | 0.44 | 0.19 | 0.72 | 0.37 | 0.66 |
| **021303** | 0.19 | 0.52 | 0.05 | 0.05 | 0.52 | 0.24 | 0.25 | 0.26 | 0.28 | 0.42 | 0.30 | 0.72 | 0.21 | 0.11 |
| **021304** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| **021305** | 0.01 | n/d | 0.00 | 0.00 | 0.11 | n/d | 0.01 | 0.01 | 0.27 | n/d | 0.00 | 0.00 | 0.09 | n/d |
| **021401** | 0.12 | 0.92 | 0.12 | 0.50 | 0.90 | 0.05 | 0.15 | 0.64 | 0.46 | 0.16 | 0.40 | 0.79 | 0.32 | 0.63 |
| **021403** | 0.36 | 0.99 | 0.40 | 0.44 | 0.72 | 0.28 | 0.11 | 0.75 | 0.63 | 0.19 | 0.91 | 0.75 | 0.72 | 0.27 |
| **021404** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| **021405** | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.01 | n/d | n/d | 0.00 | 0.00 | n/d |

| ID | 1113 | 1122 | 1123 | 1212 | 1213 | 1222 | 1223 | 3112 | 3113 | 3122 | 3123 | 3212 | 3213 | 3222 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **021501** | 0.01 | 0.29 | 0.16 | 0.22 | 0.20 | 0.12 | 0.55 | 0.53 | 0.73 | 0.13 | 0.01 | 0.17 | 0.75 | 0.43 |
| **021502** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| **021503** | 0.17 | 0.06 | 0.38 | 0.89 | 0.26 | 0.07 | 0.31 | 0.05 | 0.48 | 0.08 | 0.45 | 0.62 | 0.37 | 0.40 |
| **021504** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **021505** | 0.02 | 0.00 | 0.00 | 0.01 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **030101** | 0.44 | 0.30 | 0.39 | 0.04 | 0.72 | 0.37 | 0.52 | 0.36 | 0.70 | 0.71 | 0.04 | 0.63 | 0.41 | 0.81 |
| **030102** | 0.29 | 0.29 | 0.71 | 0.51 | 0.08 | 0.07 | 0.04 | 0.48 | 0.33 | 0.02 | 0.36 | 0.44 | 0.04 | 0.13 |
| **030103** | 0.12 | 0.04 | 0.20 | 0.20 | 0.65 | 0.45 | 0.41 | 0.21 | 0.95 | 0.38 | 0.83 | 0.25 | 0.28 | 0.24 |
| **030104** | 0.74 | 0.05 | 0.30 | 0.53 | 0.37 | 0.11 | 0.65 | 0.70 | 0.19 | 0.65 | 0.30 | 0.89 | 0.07 | 0.35 |
| **030105** | 0.15 | 0.16 | 0.35 | 0.02 | 0.57 | 0.75 | 0.64 | 0.35 | 0.69 | 0.34 | 0.04 | 0.02 | 0.13 | 0.91 |
| **030106** | 0.73 | 0.55 | 0.53 | 0.53 | 0.12 | 0.59 | 0.85 | 0.75 | 0.53 | 0.56 | 0.15 | 0.96 | 0.66 | 0.85 |
| **030107** | 0.00 | 0.70 | 0.37 | 0.48 | 0.47 | 0.49 | 0.23 | 0.74 | 0.05 | 0.79 | 0.62 | 0.65 | 0.16 | 0.31 |
| **031201** | 0.06 | 0.03 | 0.22 | 0.05 | 0.42 | 0.00 | 0.01 | 0.06 | 0.31 | 0.61 | 0.56 | 0.09 | 0.34 | 0.10 |
| **031202** | 0.01 | 0.13 | 0.54 | 0.60 | 0.06 | 0.24 | 0.51 | 0.40 | 0.68 | 0.48 | 0.01 | 0.05 | 0.13 | 0.01 |
| **031203** | 0.33 | 0.01 | 0.10 | 0.00 | 0.64 | 0.01 | 0.10 | 0.32 | 0.20 | 0.75 | 0.11 | 0.01 | 0.66 | 0.02 |
| **031204** | 0.37 | 0.14 | 0.25 | 0.00 | 0.22 | 0.04 | 0.46 | 0.01 | 0.30 | 0.01 | 0.46 | 0.18 | 0.02 | 0.00 |
| **031205** | 0.06 | 0.26 | 0.36 | 0.00 | 0.05 | 0.43 | 0.36 | 0.02 | 0.08 | 0.02 | 0.09 | 0.35 | 0.04 | 0.05 |
| **031206** | 0.20 | 0.06 | 0.39 | 0.73 | 0.31 | 0.00 | 0.20 | 0.45 | 0.92 | 0.42 | 0.62 | 0.13 | 0.51 | 0.10 |
| **031207** | 0.07 | 0.44 | 0.09 | 0.21 | 0.74 | 0.06 | 0.20 | 0.54 | 0.33 | 0.10 | 0.07 | 0.03 | 0.23 | 0.08 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 040101 | 0.14 | 0.69 | 0.97 | 0.20 | 0.12 | 0.19 | 0.73 | 0.14 | 0.43 | 0.43 | 0.17 | 0.11 | 0.39 | 0.43 |
| 040102 | 0.01 | 0.38 | 0.15 | 0.13 | 0.03 | 0.26 | 0.05 | 0.91 | 0.03 | 0.34 | 0.19 | 0.07 | 0.13 | 0.77 |
| 040103 | 0.84 | 0.22 | 0.72 | 0.70 | 0.14 | 0.97 | 0.14 | 0.04 | 0.46 | 0.53 | 0.05 | 0.45 | 0.57 | 0.03 |
| 040104 | 0.81 | 0.26 | 0.70 | 0.70 | 0.49 | 0.34 | 0.49 | 0.11 | 0.12 | 0.21 | 0.51 | 0.26 | 0.54 | 0.12 |
| 040105 | 0.04 | 0.35 | 0.04 | 0.34 | 0.11 | 0.32 | 0.87 | 0.03 | 0.40 | 0.22 | 0.49 | 0.31 | 0.38 | 0.44 |
| 040106 | 0.42 | 0.19 | 0.64 | 0.44 | 0.10 | 0.28 | 0.12 | 0.43 | 0.13 | 0.46 | 0.20 | 0.59 | 0.37 | 0.21 |
| 040107 | 0.00 | 0.20 | 0.12 | 0.70 | 0.68 | 0.57 | 0.58 | 0.64 | 0.46 | 0.36 | 0.26 | 0.36 | 0.01 | 0.15 |
| 041201 | 0.26 | 0.14 | 0.04 | 0.09 | 0.21 | 0.00 | 0.12 | 0.29 | 0.58 | 0.51 | 0.43 | 0.55 | 0.25 | 0.15 |
| 041202 | 0.00 | 0.08 | 0.14 | 0.87 | 0.02 | 0.24 | 0.14 | 0.59 | 0.40 | 0.10 | 0.00 | 0.47 | 0.01 | 0.54 |
| 041203 | 0.48 | 0.08 | 0.01 | 0.23 | 0.77 | 0.01 | 0.20 | 0.77 | 0.15 | 0.55 | 0.05 | 0.17 | 0.37 | 0.01 |
| 041204 | 0.12 | 0.18 | 0.11 | 0.00 | 0.37 | 0.09 | 0.26 | 0.00 | 0.22 | 0.01 | 0.13 | 0.35 | 0.03 | 0.00 |
| 041205 | 0.02 | 0.18 | 0.80 | 0.00 | 0.00 | 0.39 | 0.12 | 0.09 | 0.05 | 0.06 | 0.07 | 0.18 | 0.00 | 0.58 |
| 041206 | 0.16 | 0.04 | 0.64 | 0.14 | 0.37 | 0.01 | 0.07 | 0.13 | 0.05 | 0.03 | 0.55 | 0.07 | 0.29 | 0.32 |
| 041207 | 0.16 | 0.30 | 0.01 | 0.26 | 0.14 | 0.00 | 0.07 | 0.33 | 0.32 | 0.44 | 0.12 | 0.40 | 0.07 | 0.19 |
| 051601 | 0.35 | 0.07 | 0.18 | 0.06 | 0.11 | 0.07 | 0.29 | 0.12 | 0.01 | 0.10 | 0.06 | 0.29 | 0.18 | 0.57 |
| 051602 | 0.07 | 0.28 | 0.14 | 0.24 | 0.07 | 0.04 | 0.01 | 0.20 | 0.33 | 0.23 | 0.00 | 0.80 | 0.00 | 0.00 |
| 051603 | 0.15 | 0.00 | 0.50 | 0.25 | 0.93 | 0.65 | 0.07 | 0.42 | 0.21 | 0.09 | 0.01 | 0.47 | 0.22 | 0.53 |
| 051604 | 0.13 | 0.70 | 0.36 | 0.06 | 0.49 | 0.00 | 0.31 | 0.09 | 0.02 | 0.24 | 0.02 | 0.10 | 0.05 | 0.00 |
| 051605 | 0.08 | 0.39 | 0.01 | 0.30 | 0.21 | 0.36 | 0.74 | 0.00 | 0.09 | 0.08 | 0.51 | 0.75 | 0.45 | 0.36 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 051701 | 0.07 | 0.13 | 0.16 | 0.06 | 0.05 | 0.36 | 0.44 | 0.25 | 0.01 | 0.80 | 0.00 | 0.04 | 0.00 | 0.16 |
| 051702 | 0.02 | 0.75 | 0.07 | 0.67 | 0.00 | 0.62 | 0.00 | 0.01 | n/d | 0.47 | 0.20 | 0.11 | n/d | 0.07 |
| 051703 | 0.11 | 0.24 | 0.06 | 0.26 | 0.02 | 0.62 | 0.64 | 0.11 | 0.04 | 0.94 | 0.00 | 0.00 | 0.00 | 0.04 |
| 051704 | n/d | 0.19 | 0.00 | 0.01 | 0.12 | n/d | 0.00 | 0.03 | 0.01 | 0.00 | 0.00 | 0.10 | 0.00 | 0.00 |
| 051705 | 0.00 | 0.14 | 0.00 | 0.28 | 0.27 | 0.20 | 0.06 | 0.67 | 0.00 | 0.08 | 0.00 | 0.11 | 0.00 | 0.36 |
| 061601 | 0.26 | 0.36 | 0.94 | 0.13 | 0.77 | 0.98 | 0.50 | 0.57 | 0.56 | 0.79 | 0.23 | 0.53 | 0.82 | 0.04 |
| 061701 | 0.00 | 0.16 | 0.07 | 0.03 | 0.59 | 0.16 | 0.14 | 0.12 | 0.04 | 0.17 | 0.46 | 0.01 | 0.00 | 0.12 |
| 071601 | 0.17 | 0.04 | 0.80 | 0.25 | 0.09 | 0.05 | 0.30 | 0.32 | 0.05 | 0.12 | 0.17 | 0.04 | 0.34 | 0.49 |
| 071701 | 0.02 | 0.19 | 0.00 | 0.74 | 0.00 | 0.32 | 0.00 | 0.00 | n/d | 0.61 | 0.00 | 0.60 | 0.00 | 0.00 |
| 081801 | 0.50 | 0.08 | 0.50 | 0.56 | 0.07 | 0.17 | 0.10 | 0.01 | 0.76 | 0.01 | 0.96 | 0.04 | 0.17 | 0.09 |
| 081802 | 0.00 | 0.19 | 0.45 | 0.00 | 0.00 | 0.08 | 0.45 | 0.00 | 0.01 | 0.27 | 0.68 | 0.00 | 0.00 | 0.06 |
| 081803 | 0.70 | 0.19 | 0.99 | 0.01 | 0.75 | 0.30 | 0.18 | 0.80 | 0.08 | 0.40 | 0.38 | 0.23 | 0.46 | 0.77 |
| 081804 | 0.54 | 0.12 | 0.36 | 0.31 | 0.02 | 0.03 | 0.05 | 0.13 | 0.28 | 0.44 | 0.12 | 0.70 | 0.01 | 0.04 |
| 081805 | 0.00 | 0.87 | 0.04 | 0.00 | 0.00 | 0.00 | 0.27 | 0.00 | 0.09 | 0.00 | 0.43 | 0.00 | 0.00 | 0.00 |
| 081901 | 0.07 | 0.42 | 0.37 | 0.27 | 0.52 | 0.29 | 0.07 | 0.40 | 0.28 | 0.72 | 0.65 | 0.12 | 0.23 | 0.29 |
| 081902 | n/d | 0.64 | 0.00 | n/d | n/d | 0.51 | 0.53 | n/d | n/d | 0.22 | 0.53 | n/d | n/d | 0.10 |
| 081903 | 0.06 | 0.89 | 0.33 | 0.59 | 0.90 | 0.63 | 0.69 | 0.12 | 0.66 | 0.37 | 0.49 | 0.73 | 0.38 | 0.78 |
| 081904 | 0.00 | 0.50 | 0.31 | 0.00 | 0.00 | 0.01 | 0.01 | 0.00 | 0.42 | 0.01 | 0.32 | 0.03 | 0.00 | 0.02 |
| 081905 | n/d | 0.72 | 0.16 | n/d | n/d | 0.28 | 0.25 | n/d | n/d | 0.01 | 0.24 | n/d | n/d | 0.01 |

| ID | 1113 | 1122 | 1123 | 1212 | 1213 | 1222 | 1223 | 3112 | 3113 | 3122 | 3123 | 3212 | 3213 | 3222 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 082002 | n/d | 0.22 | 0.76 | n/d | n/d | n/d | n/d | n/d | n/d | 0.15 | 0.20 | n/d | n/d | n/d |
| 082003 | 0.18 | 0.51 | 0.06 | 0.05 | 0.60 | 0.54 | 0.60 | 0.67 | 0.38 | 0.06 | 0.22 | 0.94 | 0.68 | 0.89 |
| 082004 | 0.00 | 0.10 | 0.19 | 0.00 | 0.00 | n/d | 0.01 | 0.04 | 0.02 | 0.00 | 0.00 | 0.10 | 0.01 | n/d |
| 082005 | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.19 | n/d | n/d | 0.12 | 0.04 | n/d | n/d | n/d |
| 082102 | n/d | n/d | 0.29 | n/d | n/d | n/d | 0.22 | n/d | n/d | n/d | 0.58 | n/d | n/d | n/d |
| 082103 | 0.70 | 0.96 | 0.01 | 0.57 | 0.40 | 0.12 | 0.30 | 0.12 | 0.06 | 0.24 | 0.90 | 0.91 | 0.62 | 0.57 |
| 082104 | 0.28 | 0.07 | 0.22 | n/d | 0.12 | n/d | 0.04 | 0.01 | 0.01 | n/d | 0.27 | n/d | 0.06 | n/d |
| 082105 | n/d | 0.01 | 0.00 | n/d | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 |
| 082201 | 0.03 | 0.38 | 0.47 | 0.15 | 0.66 | 0.56 | 0.94 | 0.26 | 0.08 | 0.29 | 0.70 | 0.44 | 0.12 | 0.23 |
| 082202 | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082203 | 0.13 | 0.84 | 0.38 | 0.00 | 0.08 | 0.70 | 0.62 | 0.01 | 0.26 | 0.24 | 0.61 | 0.00 | 0.08 | 0.15 |
| 082204 | 0.00 | 0.00 | 0.36 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.03 | 0.06 | 0.28 | 0.00 | 0.00 | 0.00 |
| 082205 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082302 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082303 | 0.29 | 0.22 | 0.45 | 0.46 | 0.00 | 0.48 | 0.46 | 0.19 | 0.74 | 0.65 | 0.28 | 0.06 | 0.01 | 0.77 |
| 082304 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082305 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082402 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d |
| 082403 | 0.78 | 0.06 | 0.54 | 0.14 | 0.75 | 0.00 | 0.02 | 0.01 | 0.01 | 0.35 | 0.28 | 0.51 | 0.18 | 0.00 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 082404 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082405 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 |
| 082501 | 0.03 | 0.38 | 0.47 | 0.39 | 0.65 | 0.56 | 0.94 | 0.02 | 0.08 | 0.30 | 0.70 | 0.73 | 0.12 | 0.23 |
| 082502 | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082503 | 0.13 | 0.84 | 0.38 | 0.00 | 0.08 | 0.70 | 0.89 | 0.06 | 0.26 | 0.27 | 0.61 | 0.00 | 0.03 | 0.15 |
| 082504 | 0.00 | 0.00 | 0.36 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.03 | 0.06 | 0.29 | 0.00 | 0.00 | 0.00 |
| 082505 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082602 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082603 | 0.29 | 0.22 | 0.45 | 0.46 | 0.00 | 0.48 | 0.46 | 0.00 | 0.74 | 0.65 | 0.13 | 0.06 | 0.01 | 0.63 |
| 082604 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082605 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082702 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d |
| 082703 | 0.78 | 0.06 | 0.54 | 0.14 | 0.75 | 0.00 | 0.03 | 0.04 | 0.01 | 0.36 | 0.28 | 0.51 | 0.43 | 0.00 |
| 082704 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082705 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 |
| 082801 | 0.50 | 0.07 | 0.70 | 0.67 | 0.66 | 0.45 | 0.21 | 0.45 | 0.14 | 0.25 | 0.77 | 0.05 | 0.11 | 0.04 |
| 082802 | 0.00 | 0.15 | 0.34 | 0.00 | 0.00 | 0.69 | 0.64 | 0.00 | 0.00 | 0.13 | 0.13 | 0.00 | 0.00 | 0.22 |
| 082803 | 0.26 | 0.08 | 0.59 | 0.13 | 0.29 | 0.73 | 0.53 | 1.00 | 0.76 | 0.05 | 0.37 | 0.83 | 0.31 | 0.66 |
| 082804 | 0.61 | 0.40 | 0.27 | 0.44 | 0.00 | 0.01 | 0.04 | 0.10 | 0.18 | 0.45 | 0.61 | 0.73 | 0.00 | 0.05 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 082805 | 0.00 | 0.09 | 0.49 | 0.00 | 0.00 | 0.03 | 0.16 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 | 0.00 | 0.00 |
| 082901 | 0.01 | 0.28 | 0.11 | 0.21 | 0.22 | 0.20 | 0.75 | 0.52 | 0.02 | 0.07 | 0.06 | 0.04 | 0.54 | 0.26 |
| 082902 | n/d | 0.03 | 0.88 | n/d | n/d | 0.00 | 0.17 | n/d | n/d | 0.08 | 0.42 | n/d | n/d | 0.03 |
| 082903 | 0.86 | 0.54 | 0.11 | 0.12 | 0.09 | 0.79 | 0.65 | 0.03 | 0.47 | 0.07 | 0.59 | 0.03 | 0.80 | 0.13 |
| 082904 | 0.00 | 0.08 | 0.00 | 0.05 | 0.00 | n/d | 0.59 | 0.01 | 0.00 | 0.43 | 0.58 | 0.03 | 0.00 | n/d |
| 082905 | n/d | 0.00 | 0.40 | n/d | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.01 | n/d | n/d | 0.00 |
| 083002 | n/d | 0.04 | 0.52 | n/d | n/d | 0.00 | 0.00 | n/d | n/d | 0.02 | 0.18 | n/d | n/d | 0.00 |
| 083003 | 0.03 | 0.51 | 0.12 | 0.00 | 0.02 | 0.67 | 0.30 | 0.00 | 0.18 | 0.63 | 0.66 | 0.02 | 0.25 | 0.27 |
| 083004 | 0.01 | 0.03 | 0.44 | n/d | 0.10 | n/d | 0.00 | 0.00 | 0.00 | 0.06 | 0.47 | n/d | 0.04 | n/d |
| 083005 | n/d | n/d | 0.01 | n/d | n/d | 0.00 | n/d | n/d | n/d | n/d | 0.00 | n/d | n/d | n/d |
| 083102 | n/d | n/d | 0.01 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | 0.17 | n/d | n/d | n/d |
| 083103 | 0.21 | 0.12 | 0.57 | 0.00 | 0.84 | 0.12 | 0.09 | 0.04 | 0.00 | 0.01 | 0.35 | 0.00 | 0.26 | 0.01 |
| 083104 | 0.13 | 0.01 | 0.00 | n/d | 0.11 | n/d | 0.01 | 0.00 | 0.04 | n/d | 0.01 | n/d | 0.01 | n/d |
| 083105 | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 |
| 090101 | 0.29 | 0.47 | 0.84 | 0.28 | 0.70 | 0.45 | 0.11 | 0.57 | 0.21 | 0.77 | 0.99 | 0.56 | 0.33 | 0.70 |
| 090102 | 0.06 | 0.10 | 0.08 | 0.58 | 0.01 | 0.05 | 0.01 | 0.76 | 0.04 | 0.37 | 0.16 | 0.20 | 0.02 | 0.61 |
| 090103 | 0.86 | 0.00 | 0.91 | 0.78 | 0.68 | 0.32 | 0.02 | 0.56 | 0.20 | 0.65 | 0.12 | 0.56 | 0.91 | 0.10 |
| 090104 | 0.28 | 0.11 | 0.77 | 0.97 | 0.78 | 0.50 | 0.03 | 0.04 | 0.15 | 0.71 | 0.63 | 0.27 | 0.14 | 0.65 |
| 090105 | 0.63 | 0.09 | 0.06 | 0.02 | 0.05 | 0.26 | 0.57 | 0.23 | 0.39 | 0.52 | 0.34 | 0.26 | 0.64 | 0.76 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 091201 | 0.09 | 0.44 | 0.09 | 0.81 | 0.38 | 0.00 | 0.32 | 0.36 | 0.38 | 0.07 | 0.08 | 0.44 | 0.00 | 0.06 |
| 091202 | 0.00 | 0.12 | 0.07 | 0.12 | 0.03 | 0.03 | 0.04 | 0.05 | 0.37 | 0.12 | 0.00 | 0.16 | 0.00 | 0.96 |
| 091203 | 0.21 | 0.04 | 0.08 | 0.21 | 0.01 | 0.08 | 0.04 | 0.60 | 0.12 | 0.33 | 0.07 | 0.45 | 0.22 | 0.07 |
| 091204 | 0.18 | 0.79 | 0.21 | 0.00 | 0.39 | 0.01 | 0.24 | 0.03 | 0.10 | 0.01 | 0.20 | 0.36 | 0.12 | 0.09 |
| 091205 | 0.00 | 0.22 | 0.16 | 0.00 | 0.47 | 0.10 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.38 | 0.25 | 0.53 |
| 103201 | 0.04 | 0.73 | 0.27 | 0.37 | 0.02 | 0.41 | 0.55 | 0.36 | 0.04 | 0.37 | 0.16 | 0.23 | 0.82 | 0.30 |
| 103202 | 0.02 | 0.98 | 0.17 | 0.74 | 0.33 | 0.83 | 0.32 | 0.09 | n/d | 0.51 | 0.05 | 0.71 | 0.42 | 0.88 |
| 103203 | 0.45 | 0.39 | 0.34 | 0.36 | 0.04 | 0.59 | 0.02 | 0.04 | 0.36 | 0.83 | 0.64 | 0.28 | 0.79 | 0.23 |
| 103204 | 0.78 | 0.95 | 0.50 | 0.40 | 0.01 | 0.82 | 0.25 | 0.32 | 0.36 | 0.26 | 0.36 | 0.05 | 0.27 | 0.21 |
| 103205 | 0.16 | 0.01 | 0.43 | 0.17 | 0.38 | 0.00 | 0.08 | 0.66 | 0.73 | 0.69 | 0.48 | 0.05 | 0.05 | 0.21 |
| 103301 | 0.03 | 0.01 | 0.95 | 0.00 | 0.00 | 0.53 | 0.41 | 0.02 | n/d | 0.44 | 0.46 | 0.04 | 0.00 | 0.34 |
| 103302 | 0.30 | 0.24 | 0.91 | 0.28 | 0.04 | 0.32 | 0.52 | 0.48 | n/d | 0.16 | 0.00 | 0.54 | 0.64 | 0.53 |
| 103303 | 0.06 | 0.00 | 0.77 | 0.00 | 0.00 | 0.31 | 0.68 | 0.04 | n/d | 0.22 | 0.51 | 0.01 | 0.00 | 0.92 |
| 103304 | 0.43 | 0.01 | 0.31 | 0.33 | 0.42 | 0.24 | 0.40 | 0.14 | 0.04 | 0.15 | 0.69 | 0.40 | 0.43 | 0.75 |
| 103305 | 0.27 | 0.85 | 0.46 | 0.13 | 0.77 | 0.00 | 0.40 | 0.02 | 0.55 | 0.14 | 0.13 | 0.81 | 0.55 | 0.32 |
| 110101 | 0.61 | 0.06 | 0.47 | 0.05 | 0.30 | 0.26 | 0.07 | 0.60 | 0.55 | 0.47 | 0.21 | 0.07 | 0.32 | 0.57 |
| 110102 | 0.00 | 0.10 | 0.92 | 0.68 | 0.08 | 0.10 | 0.04 | 0.54 | 0.23 | 0.32 | 0.02 | 0.93 | 0.16 | 0.05 |
| 110103 | 0.08 | 0.05 | 0.14 | 0.23 | 0.44 | 0.45 | 0.27 | 0.18 | 0.34 | 0.94 | 0.15 | 0.80 | 0.43 | 0.00 |
| 110104 | 0.65 | 0.93 | 0.43 | 0.06 | 0.44 | 0.40 | 0.23 | 0.01 | 0.30 | 0.28 | 0.02 | 0.87 | 0.03 | 0.08 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **110105** | 0.03 | 0.51 | 0.25 | 0.00 | 0.02 | 0.28 | 0.07 | 0.28 | 0.06 | 0.16 | 0.17 | 0.18 | 0.00 | 0.69 |
| **111201** | 0.04 | 0.36 | 0.04 | 0.19 | 0.84 | 0.00 | 0.03 | 0.01 | 0.41 | 0.34 | 0.78 | 0.03 | 0.04 | 0.02 |
| **111202** | 0.01 | 0.01 | 0.49 | 0.27 | 0.01 | 0.08 | 0.63 | 0.16 | 0.08 | 0.04 | 0.01 | 0.09 | 0.06 | 0.00 |
| **111203** | 0.33 | 0.05 | 0.13 | 0.09 | 0.87 | 0.01 | 0.10 | 0.30 | 0.96 | 0.96 | 0.35 | 0.02 | 0.16 | 0.01 |
| **111204** | 0.22 | 0.19 | 0.15 | 0.01 | 0.38 | 0.06 | 0.41 | 0.01 | 0.21 | 0.00 | 0.37 | 0.16 | 0.03 | 0.00 |
| **111205** | 0.04 | 0.30 | 0.30 | 0.00 | 0.17 | 0.38 | 0.47 | 0.01 | 0.09 | 0.01 | 0.06 | 0.27 | 0.31 | 0.59 |
| **113401** | 0.64 | 0.45 | 0.68 | 0.22 | 0.62 | 0.77 | 0.18 | 0.14 | 0.59 | 0.11 | 0.82 | 0.25 | 0.43 | 0.76 |
| **113402** | 0.40 | 0.23 | 0.28 | 0.15 | 0.01 | 0.21 | 0.02 | 0.04 | 0.02 | 0.46 | 0.35 | 0.21 | 0.81 | 0.12 |
| **113403** | 0.19 | 0.29 | 0.59 | 0.48 | 0.81 | 0.89 | 0.41 | 0.11 | 0.61 | 0.50 | 0.67 | 0.59 | 0.08 | 0.64 |
| **113404** | 0.28 | 0.10 | 0.56 | 0.70 | 0.00 | 0.79 | 0.39 | 0.40 | 0.25 | 0.10 | 0.13 | 0.12 | 0.23 | 0.29 |
| **113405** | 0.14 | 0.03 | 0.30 | 0.01 | 0.03 | 0.08 | 0.17 | 0.41 | 0.23 | 0.29 | 0.00 | 0.49 | 0.64 | 0.43 |
| **120101** | 0.08 | 0.71 | 0.74 | 0.63 | 0.08 | 0.11 | 0.57 | 0.88 | 0.02 | 0.08 | 0.83 | 0.49 | 0.13 | 0.08 |
| **120102** | 0.00 | 0.02 | 0.19 | 0.25 | 0.08 | 0.42 | 0.07 | 0.37 | 0.48 | 0.60 | 0.01 | 0.74 | 0.18 | 0.44 |
| **120103** | 0.12 | 0.52 | 0.56 | 0.64 | 0.04 | 0.49 | 0.13 | 0.22 | 0.20 | 0.38 | 0.80 | 0.50 | 0.44 | 0.44 |
| **120104** | 0.38 | 0.39 | 0.20 | 0.02 | 0.06 | 0.59 | 0.47 | 0.05 | 0.05 | 0.08 | 0.41 | 0.50 | 0.00 | 0.11 |
| **120105** | 0.05 | 0.30 | 0.14 | 0.01 | 0.00 | 0.44 | 0.09 | 0.01 | 0.01 | 0.32 | 0.35 | 0.35 | 0.20 | 0.92 |
| **121201** | 0.02 | 0.35 | 0.00 | 0.01 | 0.59 | 0.00 | 0.02 | 0.08 | 0.36 | 0.29 | 0.43 | 0.06 | 0.06 | 0.00 |
| **121202** | 0.00 | 0.00 | 0.02 | 0.44 | 0.00 | 0.12 | 0.23 | 0.07 | 0.07 | 0.36 | 0.01 | 0.68 | 0.11 | 0.06 |
| **121203** | 0.28 | 0.28 | 0.03 | 0.03 | 0.74 | 0.00 | 0.08 | 0.27 | 0.25 | 0.03 | 0.22 | 0.02 | 0.19 | 0.03 |

| ID | 1113 | 1122 | 1123 | 1212 | 1213 | 1222 | 1223 | 3112 | 3113 | 3122 | 3123 | 3212 | 3213 | 3222 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **121204** | 0.14 | 0.15 | 0.06 | 0.01 | 0.12 | 0.02 | 0.53 | 0.00 | 0.63 | 0.02 | 0.56 | 0.25 | 0.02 | 0.00 |
| **121205** | 0.08 | 0.90 | 0.10 | 0.00 | 0.01 | 0.29 | 0.39 | 0.12 | 0.01 | 0.00 | 0.00 | 0.56 | 0.02 | 0.08 |
| **123401** | 0.86 | 0.97 | 0.19 | 0.01 | 0.03 | 0.72 | 0.72 | 0.81 | 0.26 | 0.21 | 0.80 | 0.81 | 0.27 | 0.09 |
| **123402** | 0.69 | 0.22 | 0.12 | 0.40 | 0.00 | 0.00 | 0.13 | 0.17 | 0.01 | 0.24 | 0.02 | 0.00 | 0.00 | 0.02 |
| **123403** | 0.75 | 0.54 | 0.24 | 0.76 | 0.20 | 0.06 | 0.10 | 0.15 | 0.03 | 0.39 | 0.67 | 0.30 | 0.36 | 0.46 |
| **123404** | 0.06 | 0.01 | 0.54 | 0.02 | 0.51 | 0.21 | 0.81 | 0.41 | 0.45 | 0.03 | 0.14 | 0.40 | 0.77 | 0.00 |
| **123405** | 0.06 | 0.11 | 0.00 | 0.07 | 0.19 | 0.03 | 0.70 | 0.54 | 0.00 | 0.11 | 0.34 | 0.04 | 0.00 | 0.04 |
| **130101** | 0.01 | 0.58 | 0.26 | 0.08 | 0.38 | 0.57 | 0.42 | 0.04 | 0.06 | 0.79 | 0.59 | 0.40 | 0.06 | 0.65 |
| **130102** | 0.58 | 0.49 | 0.09 | 0.77 | 0.04 | 0.19 | 0.18 | 0.12 | 0.17 | 0.06 | 0.46 | 0.65 | 0.02 | 0.39 |
| **130103** | 0.02 | 0.66 | 0.30 | 0.16 | 0.65 | 0.17 | 0.59 | 0.02 | 0.05 | 0.54 | 0.07 | 0.50 | 0.32 | 0.67 |
| **130104** | 0.03 | 0.78 | 0.06 | 0.03 | 0.65 | 0.15 | 0.02 | 0.39 | 0.39 | 0.59 | 0.39 | 0.74 | 0.49 | 0.36 |
| **130105** | 0.26 | 0.88 | 0.37 | 0.59 | 0.23 | 0.53 | 0.35 | 0.46 | 0.39 | 0.77 | 0.74 | 0.51 | 0.14 | 0.82 |
| **131201** | 0.00 | 0.03 | 0.32 | 0.45 | 0.40 | 0.80 | 0.07 | 0.37 | 0.03 | 0.39 | 0.20 | 0.62 | 0.12 | 0.37 |
| **131202** | 0.37 | 0.77 | 0.12 | 0.22 | 0.01 | 0.06 | 0.58 | 0.01 | 0.24 | 0.00 | 0.58 | 0.77 | 0.00 | 0.07 |
| **131203** | 0.00 | 0.00 | 0.27 | 0.61 | 0.21 | 0.61 | 0.05 | 0.68 | 0.04 | 0.28 | 0.23 | 0.19 | 0.06 | 0.90 |
| **131204** | 0.43 | 0.11 | 0.71 | 0.11 | 0.51 | 0.03 | 0.03 | 0.05 | 0.21 | 0.16 | 0.31 | 0.99 | 0.20 | 0.61 |
| **131205** | 0.00 | 0.55 | 0.25 | 0.50 | 0.05 | 0.78 | 0.39 | 0.03 | 0.14 | 0.36 | 0.67 | 0.07 | 0.07 | 0.01 |
| **143501** | 0.52 | 0.91 | 0.51 | 0.34 | 0.02 | 0.33 | 0.37 | 0.06 | 0.21 | 0.35 | 0.47 | 0.00 | 0.08 | 0.83 |
| **153501** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 163601 | 0.04 | 0.03 | 0.45 | 0.34 | 0.00 | 0.17 | 0.09 | 0.26 | 0.13 | 0.40 | 0.29 | 0.85 | 0.10 | 0.06 |
| 163602 | 0.15 | 0.18 | 0.26 | 0.15 | 0.37 | 0.57 | 0.12 | 0.18 | 0.54 | 0.25 | 0.19 | 0.30 | 0.88 | 0.15 |
| 163603 | 0.00 | 0.00 | 0.59 | 0.13 | 0.01 | 0.20 | 0.06 | 0.46 | 0.09 | 0.26 | 0.46 | 0.38 | 0.34 | 0.09 |
| 163604 | 0.43 | 0.76 | 0.15 | 0.60 | 0.38 | 0.34 | 0.46 | 0.40 | 0.57 | 0.84 | 0.75 | 0.09 | 0.67 | 0.19 |
| 163605 | 0.28 | 0.67 | 0.77 | 0.37 | 0.99 | 0.09 | 0.77 | 0.28 | 0.41 | 0.52 | 0.46 | 0.17 | 0.38 | 0.86 |
| 163701 | 0.00 | 0.20 | 0.00 | 0.00 | 0.01 | 0.38 | 0.60 | 0.00 | 0.00 | 0.17 | 0.45 | 0.00 | 0.00 | 0.49 |
| 163702 | 0.11 | 0.01 | 0.02 | 0.22 | 0.00 | 0.04 | 0.37 | 0.20 | 0.02 | 0.10 | 0.08 | 0.51 | 0.09 | 0.01 |
| 163703 | 0.00 | 0.38 | 0.00 | 0.00 | 0.01 | 0.54 | 0.45 | 0.00 | 0.00 | 0.25 | 0.38 | 0.00 | 0.00 | 0.17 |
| 163704 | 0.58 | 0.81 | 0.39 | 0.66 | 0.03 | 0.25 | 0.56 | 0.09 | 0.36 | 0.62 | 0.44 | 0.55 | 0.41 | 0.26 |
| 163705 | 0.27 | 0.21 | 0.38 | 0.16 | 0.54 | 0.07 | 0.83 | 0.82 | 0.87 | 0.07 | 0.85 | 0.15 | 0.94 | 0.72 |
| 163801 | 0.32 | 0.23 | 0.23 | 0.02 | 0.28 | 0.35 | 0.00 | 0.00 | 0.30 | 0.38 | 0.66 | 0.02 | 0.05 | 0.35 |
| 163802 | n/d | 0.44 | 0.01 | 0.00 | 0.00 | 0.12 | 0.66 | 0.00 | n/d | 0.11 | 0.17 | 0.00 | n/d | 0.01 |
| 163803 | 0.69 | 0.00 | 0.55 | 0.01 | 0.26 | 0.21 | 0.00 | 0.00 | 0.22 | 0.27 | 0.12 | 0.04 | 0.08 | 0.14 |
| 163804 | 0.03 | 0.04 | 0.44 | 0.42 | 0.21 | 0.11 | 0.14 | 0.01 | 0.00 | 0.50 | 0.20 | 0.01 | 0.12 | 0.04 |
| 163805 | 0.00 | 0.59 | 0.44 | 0.00 | 0.00 | 0.23 | 0.50 | 0.00 | 0.01 | 0.04 | 0.02 | 0.00 | 0.00 | 0.14 |
| 163901 | 0.15 | 0.31 | 0.03 | 0.00 | 0.05 | 0.81 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.02 | 0.03 | 0.79 |
| 163902 | n/d | 0.77 | 0.69 | 0.00 | 0.00 | 0.00 | 0.56 | 0.00 | n/d | 0.55 | 0.89 | 0.00 | n/d | 0.00 |
| 163903 | 0.25 | 0.37 | 0.01 | 0.00 | 0.04 | 0.76 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.03 | 0.03 | 0.89 |
| 163904 | 0.00 | 0.01 | 0.01 | 0.22 | 0.14 | 0.07 | 0.13 | 0.05 | 0.00 | 0.85 | 0.24 | 0.00 | 0.10 | 0.00 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 163905 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.17 | 0.44 | 0.00 | 0.00 | 0.02 | 0.43 | 0.00 | 0.00 | 0.17 |
| 171601 | 0.61 | 0.01 | 0.70 | 0.48 | 0.81 | 0.00 | 0.53 | 0.47 | 0.20 | 0.15 | 0.15 | 0.31 | 0.29 | 0.00 |
| 171602 | 0.02 | 0.10 | 0.16 | 0.36 | 0.01 | 0.00 | 0.01 | 0.09 | 0.07 | 0.07 | 0.02 | 0.04 | 0.02 | 0.02 |
| 171603 | 0.24 | 0.00 | 0.91 | 0.74 | 0.74 | 0.01 | 0.02 | 0.16 | 0.28 | 0.15 | 0.12 | 0.79 | 0.05 | 0.01 |
| 171604 | 0.11 | 0.12 | 0.06 | 0.00 | 0.19 | 0.00 | 0.12 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.10 | 0.00 |
| 171605 | 0.00 | 0.07 | 0.00 | 0.02 | 0.00 | 0.12 | 0.25 | 0.13 | 0.00 | 0.00 | 0.01 | 0.00 | 0.10 | 0.60 |
| 171701 | 0.24 | 0.04 | 0.36 | 0.13 | 0.04 | 0.00 | 0.01 | 0.64 | 0.24 | 0.37 | 0.04 | 0.22 | 0.41 | 0.01 |
| 171702 | 0.00 | 0.25 | 0.04 | 0.50 | 0.00 | 0.00 | 0.01 | 0.59 | 0.05 | 0.08 | 0.01 | 0.33 | 0.00 | 0.20 |
| 171703 | 0.04 | 0.00 | 0.41 | 0.39 | 0.00 | 0.00 | 0.01 | 0.30 | 0.37 | 0.06 | 0.01 | 0.44 | 0.00 | 0.08 |
| 171704 | 0.03 | 0.20 | 0.06 | 0.00 | 0.02 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| 171705 | 0.00 | 0.01 | 0.00 | 0.02 | 0.26 | 0.04 | 0.10 | 0.08 | 0.02 | 0.01 | 0.10 | 0.05 | 0.22 | 0.06 |
| 174001 | 0.33 | 0.03 | 0.25 | 0.53 | 0.20 | 0.00 | 0.62 | 0.01 | 0.36 | 0.00 | 0.20 | 0.36 | 0.02 | 0.02 |
| 174002 | 0.02 | 0.00 | 0.22 | 0.09 | 0.00 | 0.01 | 0.02 | 0.02 | 0.09 | 0.00 | 0.01 | 0.12 | 0.00 | 0.05 |
| 174003 | 0.34 | 0.02 | 0.03 | 0.04 | 0.49 | 0.04 | 0.34 | 0.87 | 0.54 | 0.00 | 0.35 | 0.02 | 0.16 | 0.08 |
| 174004 | 0.05 | 0.13 | 0.06 | 0.01 | 0.05 | 0.00 | 0.21 | 0.07 | 0.02 | 0.00 | 0.00 | 0.00 | 0.05 | 0.02 |
| 174005 | 0.00 | 0.01 | 0.02 | 0.01 | 0.23 | 0.20 | 0.29 | 0.00 | 0.00 | 0.00 | 0.02 | 0.01 | 0.02 | 0.05 |
| 174101 | 0.18 | 0.18 | 0.54 | 0.95 | 0.48 | 0.23 | 0.94 | 0.51 | 0.72 | 0.75 | 0.70 | 0.81 | 0.59 | 0.28 |
| 174102 | 0.02 | 0.30 | 0.58 | 0.03 | 0.01 | 0.01 | 0.04 | 0.80 | 0.07 | 0.12 | 0.23 | 0.04 | 0.00 | 0.28 |
| 174103 | 0.09 | 0.07 | 0.69 | 0.39 | 0.45 | 0.30 | 0.42 | 0.75 | 0.51 | 0.79 | 0.33 | 0.63 | 0.63 | 0.85 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **174104** | n/d | 0.04 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **174105** | 0.07 | 0.06 | 0.21 | 0.00 | 0.08 | 0.01 | 0.00 | 0.06 | 0.13 | n/d | 0.02 | 0.14 | 0.33 | 0.02 |
| **174201** | 0.29 | 0.00 | 0.41 | 0.14 | 0.02 | 0.00 | 0.01 | 0.00 | 0.12 | 0.06 | 0.10 | 0.40 | 0.48 | 0.11 |
| **174202** | 0.01 | 0.00 | 0.03 | 0.15 | 0.00 | 0.02 | 0.00 | 0.00 | 0.05 | 0.01 | 0.02 | 0.20 | 0.00 | 0.00 |
| **174203** | 0.01 | 0.00 | 0.05 | 0.11 | 0.06 | 0.01 | 0.12 | 0.59 | 0.76 | 0.00 | 0.01 | 0.02 | 0.36 | 0.00 |
| **174204** | 0.04 | 0.24 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.07 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 |
| **174205** | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.09 | 0.07 | 0.00 | 0.03 | 0.00 | n/d | 0.01 | 0.08 | 0.02 |
| **174301** | 0.29 | 0.14 | 0.07 | 0.10 | 0.48 | 0.15 | 0.30 | 0.37 | 0.41 | 0.16 | 0.77 | 0.51 | 0.76 | 0.17 |
| **174302** | 0.32 | 0.31 | 0.21 | 0.08 | 0.07 | 0.01 | 0.00 | 0.10 | 0.44 | 0.09 | 0.06 | 0.14 | n/d | 0.03 |
| **174303** | 0.54 | 0.31 | 0.85 | 0.11 | 0.48 | 0.16 | 0.43 | 0.13 | 0.37 | 0.08 | 0.41 | 0.96 | 0.24 | 0.26 |
| **174304** | n/d | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| **174305** | 0.04 | 0.00 | 0.01 | 0.02 | 0.07 | 0.00 | 0.00 | 0.02 | 0.03 | 0.00 | 0.00 | 0.02 | 0.05 | 0.02 |
| **184401** | 0.00 | n/d | n/d | n/d | 0.01 | 0.00 | n/d | 0.03 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.05 |
| **184402** | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | n/d | n/d | n/d | n/d |
| **184403** | 0.00 | n/d | n/d | n/d | 0.00 | 0.00 | n/d | 0.03 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.01 |
| **184404** | 0.00 | n/d | 0.01 | n/d | 0.00 | n/d | 0.00 | n/d | 0.04 | n/d | n/d | 0.00 | n/d | n/d |
| **184405** | n/d | 0.01 | n/d | 0.02 | n/d | n/d | 0.04 | 0.01 | 0.00 | n/d | n/d | 0.00 | n/d | n/d |
| **190101** | 0.12 | 0.10 | 0.49 | 0.34 | 0.61 | 0.84 | 0.12 | 0.07 | 0.21 | 0.49 | 0.25 | 0.21 | 0.42 | 0.26 |
| **190102** | n/d | 0.38 | 0.31 | n/d | n/d | 0.32 | 0.04 | n/d | n/d | 0.05 | 0.46 | n/d | n/d | 0.64 |

| ID | 1113 | 1122 | 1123 | 1212 | 1213 | 1222 | 1223 | 3112 | 3113 | 3122 | 3123 | 3212 | 3213 | 3222 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **190103** | 0.36 | 0.49 | 0.52 | 0.41 | 0.43 | 0.14 | 0.08 | 0.12 | 0.22 | 0.85 | 0.06 | 0.07 | 0.28 | 0.08 |
| **190104** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| **190105** | n/d | 0.44 | n/d | n/d | n/d | 0.00 | 0.08 | n/d | n/d | 0.20 | 0.01 | n/d | n/d | 0.01 |
| **191201** | 0.07 | 0.27 | 0.42 | 0.14 | 0.31 | 0.10 | 0.39 | 0.15 | 0.00 | 0.62 | 0.14 | 0.78 | 0.62 | 0.31 |
| **191202** | n/d | n/d | 0.00 | n/d | n/d | 0.10 | 0.00 | n/d | n/d | 0.24 | 0.00 | n/d | n/d | 0.04 |
| **191203** | 0.50 | 0.29 | 0.29 | 0.05 | 0.23 | 0.38 | 0.50 | 0.07 | 0.01 | 0.21 | 0.21 | 0.61 | 0.31 | 0.27 |
| **191204** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| **191205** | n/d | 0.00 | n/d | n/d | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | n/d | n/d | n/d | 0.01 |
| **193402** | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **193403** | 0.12 | 0.55 | 0.03 | 0.59 | 0.45 | 0.32 | 0.17 | 0.53 | 0.01 | 0.40 | 0.48 | 0.48 | 0.20 | 0.01 |
| **193404** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 |
| **193405** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **194501** | 0.25 | 0.68 | 0.01 | 0.66 | 0.00 | 0.52 | 0.30 | 0.31 | 0.09 | 0.57 | 0.07 | 0.19 | 0.45 | 0.23 |
| **194601** | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **194701** | 0.00 | 0.00 | 0.00 | n/d | n/d | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **194801** | 0.73 | 0.68 | 0.01 | 0.65 | 0.00 | 0.51 | 0.30 | 0.39 | 0.24 | 0.57 | 0.86 | 0.15 | 0.45 | 0.23 |
| **194802** | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **194803** | 0.12 | 0.56 | 0.02 | 0.60 | 0.45 | 0.32 | 0.11 | 0.26 | 0.01 | 0.40 | 0.11 | 0.48 | 0.00 | 0.01 |
| **194804** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 |

| ID | 1113 | 1122 | 1123 | 1212 | 1213 | 1222 | 1223 | 3112 | 3113 | 3122 | 3123 | 3212 | 3213 | 3222 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 194805 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194901 | 0.07 | 0.29 | 0.68 | 0.12 | 0.49 | 0.38 | 0.60 | 0.25 | 0.12 | 0.74 | 0.13 | 0.23 | 0.01 | 0.61 |
| 194902 | n/d | 0.46 | 0.29 | 0.00 | 0.00 | 0.05 | 0.06 | 0.00 | n/d | 0.29 | 0.46 | 0.00 | n/d | 0.49 |
| 194903 | 0.01 | 0.84 | 0.55 | 0.20 | 0.56 | 0.65 | 0.43 | 0.65 | 0.13 | 0.15 | 0.87 | 0.21 | 0.00 | 0.91 |
| 194904 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.04 |
| 194905 | 0.00 | 0.57 | 0.00 | 0.00 | 0.00 | 0.09 | 0.45 | 0.00 | 0.00 | 0.00 | 0.40 | 0.00 | 0.00 | 0.15 |
| 205001 | 0.07 | 0.33 | 0.05 | 0.80 | 0.21 | 0.46 | 0.21 | 0.30 | 0.24 | 0.50 | 0.79 | 0.52 | 0.47 | 0.57 |
| 205002 | n/d | 0.24 | 0.62 | n/d | n/d | 0.48 | 0.54 | n/d | n/d | 0.25 | 0.45 | n/d | n/d | 0.91 |
| 205003 | 0.72 | 0.21 | 0.65 | 0.60 | 0.02 | 0.46 | 0.61 | 0.10 | 0.55 | 0.56 | 0.08 | 0.52 | 0.48 | 0.22 |
| 205004 | 0.94 | 0.73 | 0.07 | 0.04 | 0.39 | 0.00 | 0.86 | 0.05 | 0.16 | 0.00 | 0.61 | 0.13 | 0.68 | n/d |
| 205005 | n/d | 0.02 | 0.38 | n/d | n/d | 0.40 | 0.03 | n/d | n/d | 0.39 | 0.20 | n/d | n/d | 0.56 |
| 205101 | 0.29 | 0.37 | 0.80 | 0.05 | 0.10 | 0.88 | 0.28 | 0.43 | 0.14 | 0.78 | 0.37 | 0.19 | 0.03 | 0.56 |
| 205102 | n/d | 0.00 | 0.01 | n/d | n/d | 0.00 | 0.01 | n/d | n/d | 0.28 | 0.01 | n/d | n/d | 0.07 |
| 205103 | 0.72 | 0.28 | 0.60 | 0.33 | 0.15 | 0.07 | 0.64 | 0.07 | 0.15 | 0.42 | 0.54 | 0.28 | 0.30 | 0.93 |
| 205104 | 0.20 | 0.07 | 0.04 | 0.00 | 0.01 | 0.00 | 0.11 | 0.00 | 0.01 | 0.66 | 0.25 | 0.02 | 0.00 | n/d |
| 205105 | n/d | 0.27 | 0.04 | n/d | n/d | 0.00 | 0.01 | n/d | n/d | 0.02 | 0.59 | n/d | n/d | 0.05 |
| 205201 | 0.48 | 0.54 | 0.32 | 0.06 | 0.75 | 0.20 | 0.23 | 0.08 | 0.48 | 0.17 | 0.58 | 0.31 | 0.57 | 0.58 |
| 205202 | 0.14 | 0.30 | 0.09 | n/d | 0.40 | 0.23 | 0.24 | n/d | n/d | 0.02 | 0.06 | n/d | n/d | 0.46 |
| 205203 | 0.34 | 0.49 | 0.58 | 0.21 | 0.72 | 0.86 | 0.48 | 0.03 | 0.90 | 0.21 | 0.62 | 0.58 | 0.50 | 0.24 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **205204** | 0.74 | 0.42 | 0.37 | 0.36 | 0.11 | 0.34 | 0.28 | 0.14 | 0.77 | 0.73 | 0.66 | 0.14 | 0.51 | 0.31 |
| **205205** | n/d | 0.55 | 0.05 | n/d | n/d | 0.88 | 0.13 | n/d | 0.71 | 0.58 | 0.26 | n/d | n/d | 0.43 |
| **205301** | 0.43 | 0.29 | 0.00 | 0.07 | 0.49 | 0.10 | 0.25 | 0.05 | 0.27 | 0.13 | 0.00 | 0.19 | 0.01 | 0.33 |
| **205302** | n/d | 0.03 | 0.75 | n/d | n/d | 0.01 | 0.18 | n/d | n/d | 0.52 | 0.42 | n/d | n/d | 0.01 |
| **205303** | 0.47 | 0.35 | 0.48 | 0.06 | 0.12 | 0.22 | 0.24 | 0.27 | 0.02 | 0.71 | 0.54 | 0.02 | 0.06 | 0.00 |
| **205304** | 0.47 | 0.50 | 0.55 | 0.12 | 0.10 | n/d | 0.24 | 0.03 | 0.67 | 0.70 | 0.52 | 0.47 | 0.30 | n/d |
| **205305** | n/d | 0.58 | 0.53 | n/d | n/d | 0.32 | 0.27 | n/d | n/d | 0.28 | 0.45 | n/d | n/d | 0.09 |
| **205401** | 0.20 | 0.01 | 0.14 | 0.01 | 0.55 | 0.42 | 0.01 | 0.41 | 0.10 | 0.25 | 0.62 | 0.00 | 0.09 | 0.00 |
| **205402** | n/d | 0.01 | 0.00 | n/d | n/d | 0.00 | 0.01 | n/d | n/d | 0.09 | 0.16 | n/d | n/d | 0.00 |
| **205403** | 0.12 | 0.24 | 0.20 | 0.01 | 0.66 | 0.53 | 0.24 | 0.10 | 0.03 | 0.97 | 0.17 | 0.00 | 0.02 | 0.02 |
| **205404** | 0.02 | 0.01 | 0.10 | 0.01 | 0.00 | n/d | 0.00 | 0.04 | 0.01 | 0.31 | 0.28 | 0.17 | 0.00 | n/d |
| **205405** | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.02 | n/d | n/d | 0.01 | 0.07 | n/d | n/d | 0.00 |
| **205501** | 0.16 | 0.49 | 0.42 | 0.27 | 0.24 | 0.70 | 0.59 | 0.45 | 0.45 | 0.17 | 0.17 | 0.26 | 0.94 | 0.26 |
| **205502** | n/d | 0.32 | 0.52 | n/d | n/d | 0.02 | 0.55 | n/d | n/d | 0.85 | 0.52 | n/d | n/d | n/d |
| **205503** | 0.33 | 0.92 | 0.14 | 0.04 | 0.38 | 0.62 | 0.10 | 0.00 | 0.09 | 0.29 | 0.31 | 0.13 | 0.24 | 0.83 |
| **205504** | 0.34 | 0.03 | 0.71 | 0.06 | 0.76 | n/d | 0.69 | 0.05 | 0.25 | 0.59 | 0.63 | 0.12 | 0.45 | n/d |
| **205505** | n/d | 0.33 | 0.61 | n/d | n/d | 0.42 | 0.41 | n/d | n/d | 0.06 | 0.85 | n/d | n/d | 0.00 |
| **205601** | 0.28 | 0.18 | 0.45 | 0.94 | 0.10 | 0.10 | 0.36 | 0.89 | 0.50 | 0.21 | 0.51 | 0.33 | 0.13 | 0.18 |
| **205602** | 0.00 | 0.18 | 0.77 | 0.00 | 0.00 | 0.28 | 0.04 | 0.00 | 0.00 | 0.25 | 0.12 | 0.00 | 0.00 | 0.00 |

| ID | 111 3 | 112 2 | 112 3 | 121 2 | 121 3 | 122 2 | 122 3 | 311 2 | 311 3 | 312 2 | 312 3 | 321 2 | 321 3 | 322 2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **205603** | 0.23 | 0.34 | 0.25 | 0.77 | 0.19 | 0.69 | 0.32 | 0.86 | 0.67 | 0.28 | 0.13 | 0.67 | 0.42 | 0.34 |
| **205604** | 0.35 | 0.52 | 0.66 | 0.11 | 0.41 | 0.00 | 0.00 | 0.00 | 0.03 | 0.01 | 0.05 | 0.01 | 0.30 | 0.01 |
| **205605** | 0.00 | 0.60 | 0.15 | 0.00 | 0.00 | 0.41 | 0.06 | 0.00 | 0.00 | 0.58 | 0.14 | 0.00 | 0.00 | 0.68 |
| **205701** | 0.20 | 0.88 | 0.23 | 0.41 | 0.46 | 0.17 | 0.85 | 0.66 | 0.65 | 0.64 | 0.95 | 0.36 | 0.52 | 0.23 |
| **205702** | 0.48 | 0.12 | 0.03 | 0.00 | 0.02 | 0.01 | 0.65 | 0.00 | 0.00 | 0.53 | 0.11 | 0.00 | 0.03 | 0.10 |
| **205703** | 0.67 | 0.10 | 0.40 | 0.10 | 0.37 | 0.98 | 0.11 | 0.37 | 0.47 | 0.31 | 0.86 | 0.01 | 0.70 | 0.33 |
| **205704** | 0.30 | 0.02 | 0.50 | 0.31 | 0.01 | 0.01 | 0.16 | 0.19 | 0.48 | 0.56 | 0.41 | 0.01 | 0.05 | 0.02 |
| **205705** | 0.00 | 0.72 | 0.45 | 0.00 | 0.00 | 0.03 | 0.17 | 0.00 | 0.02 | 0.28 | 0.36 | 0.00 | 0.00 | 0.01 |
| **205801** | 0.92 | 0.64 | 0.32 | 0.01 | 0.92 | 0.36 | 0.17 | 0.08 | 0.89 | 0.60 | 0.39 | 0.42 | 0.69 | 0.60 |
| **205802** | 0.00 | 0.86 | 0.27 | 0.00 | 0.00 | 0.39 | 0.68 | 0.00 | 0.00 | 0.42 | 0.21 | 0.00 | 0.00 | 0.31 |
| **205803** | 0.39 | 0.24 | 0.99 | 0.44 | 0.39 | 0.28 | 0.75 | 0.39 | 0.16 | 0.31 | 0.80 | 0.39 | 0.60 | 0.30 |
| **205804** | 0.12 | 0.05 | 0.15 | 0.03 | 0.18 | 0.00 | 0.64 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.58 | 0.00 |
| **205805** | 0.00 | 0.10 | 0.14 | 0.00 | 0.00 | 0.69 | 0.40 | 0.00 | 0.00 | 0.76 | 0.04 | 0.00 | 0.00 | 0.32 |
| **210101** | 0.52 | 0.24 | 0.62 | 0.32 | 0.75 | 0.49 | 0.30 | 0.52 | 0.25 | 0.56 | 0.94 | 0.70 | 0.61 | 0.76 |
| **210102** | 0.21 | 0.22 | 0.68 | 0.22 | 0.15 | 0.16 | 0.95 | 0.34 | 0.35 | 0.16 | 0.03 | 0.05 | 0.07 | 0.86 |
| **210103** | 0.59 | 0.25 | 0.26 | 0.44 | 0.78 | 0.43 | 0.22 | 0.84 | 0.01 | 0.23 | 0.48 | 0.52 | 0.84 | 0.43 |
| **210104** | 0.77 | 0.38 | 0.33 | 0.98 | 0.79 | 0.39 | 0.54 | 0.45 | 0.17 | 0.27 | 0.11 | 0.32 | 0.10 | 0.55 |
| **210105** | 0.23 | 0.52 | 0.29 | 0.24 | 0.00 | 0.01 | 0.12 | 0.74 | 0.02 | 0.56 | 0.05 | 0.12 | 0.14 | 0.39 |
| **211201** | 0.00 | 0.03 | 0.00 | 0.57 | 0.00 | 0.82 | 0.49 | 0.41 | 0.19 | 0.61 | 0.56 | 0.80 | 0.00 | 0.45 |

| ID | 1113 | 1122 | 1123 | 1212 | 1213 | 1222 | 1223 | 3112 | 3113 | 3122 | 3123 | 3212 | 3213 | 3222 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **211202** | 0.24 | 0.11 | 0.05 | 0.61 | 0.12 | 0.58 | 0.49 | 0.21 | 0.43 | 0.70 | 0.53 | 0.21 | 0.70 | 0.26 |
| **211203** | 0.06 | 0.01 | 0.01 | 0.79 | 0.05 | 0.98 | 0.34 | 0.37 | 0.09 | 0.87 | 0.28 | 0.57 | 0.00 | 0.13 |
| **211204** | 0.45 | 0.15 | 0.26 | 0.35 | 0.01 | 0.43 | 0.37 | 0.13 | 0.46 | 0.27 | 0.66 | 0.38 | 0.00 | 0.31 |
| **211205** | 0.68 | 0.36 | 0.06 | 0.04 | 0.00 | 0.23 | 0.91 | 0.24 | 0.34 | 0.39 | 0.48 | 0.07 | 0.07 | 0.30 |
| **214901** | 0.30 | 0.97 | 0.71 | 0.18 | 0.55 | 0.73 | 0.04 | 0.71 | 0.90 | 0.35 | 0.50 | 0.84 | 0.87 | 0.18 |
| **214902** | 0.00 | 0.29 | 0.04 | 0.25 | 0.03 | 0.02 | 0.16 | 0.29 | 0.40 | 0.00 | 0.39 | 0.03 | 0.00 | 0.14 |
| **214903** | 0.32 | 0.93 | 0.35 | 0.05 | 0.34 | 0.56 | 0.01 | 0.41 | 0.10 | 0.24 | 0.72 | 0.91 | 0.81 | 0.21 |
| **214904** | 0.03 | 0.55 | 0.89 | 0.20 | 0.46 | 0.11 | 0.07 | 0.34 | 0.33 | 0.99 | 0.13 | 0.07 | 0.00 | 0.06 |
| **214905** | 0.86 | 0.82 | 0.04 | 0.79 | 0.01 | 0.01 | 0.07 | 0.14 | 0.93 | 0.07 | 0.01 | 0.52 | 0.44 | 0.15 |

| *ID* | *3223* | *1112* | *2113* | *2122* | *2123* | *2212* | *2213* | *2222* | *2223* | *2112* | *1121* | *1211* | *1221* | *2111* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***010101*** | 0.45 | 0.25 | 0.71 | 0.55 | 0.54 | 0.14 | 0.62 | 0.97 | 0.37 | 0.85 | 0.51 | 0.45 | 0.43 | 0.49 |
| ***010102*** | 0.63 | 0.64 | 0.21 | 0.70 | 0.57 | 0.61 | 0.81 | 0.07 | 0.55 | 0.21 | 0.84 | 0.66 | 0.06 | 0.21 |
| ***010103*** | 0.52 | 0.62 | 0.16 | 0.50 | 0.85 | 0.10 | 0.67 | 0.62 | 0.83 | 0.09 | 0.46 | 0.16 | 0.25 | 1.00 |
| ***010104*** | 0.28 | 0.79 | 0.34 | 0.87 | 0.24 | 0.88 | 0.66 | 0.36 | 0.24 | 0.48 | 0.27 | 0.12 | 0.43 | 0.41 |
| ***010105*** | 0.01 | 0.17 | 0.26 | 0.39 | 0.16 | 0.89 | 0.72 | 0.53 | 0.47 | 0.18 | 0.12 | 0.76 | 0.44 | 0.29 |
| ***010201*** | 0.08 | 0.72 | 0.71 | 0.41 | 0.01 | 0.60 | 0.87 | 0.81 | 0.02 | 0.89 | 0.89 | 0.85 | 0.72 | 0.01 |
| ***010202*** | 0.56 | 0.37 | 0.79 | 0.12 | 0.14 | 0.89 | 0.11 | 0.15 | 0.12 | 0.04 | 0.03 | 0.16 | 0.13 | 0.77 |
| ***010203*** | 0.10 | 0.75 | 0.87 | 0.92 | 0.00 | 0.25 | 0.64 | 0.37 | 0.32 | 0.89 | 0.91 | 0.57 | 0.85 | 0.02 |

| *ID* | ***3223*** | ***1112*** | ***2113*** | ***2122*** | ***2123*** | ***2212*** | ***2213*** | ***2222*** | ***2223*** | ***2112*** | ***1121*** | ***1211*** | ***1221*** | ***2111*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***010204*** | 0.96 | 0.13 | 0.19 | 0.70 | 0.08 | 0.68 | 0.34 | 0.01 | 0.05 | 0.03 | 0.03 | 0.59 | 0.04 | 0.42 |
| ***010205*** | 0.22 | 0.93 | 0.19 | 0.40 | 0.52 | 0.04 | 0.58 | 0.12 | 0.36 | 0.14 | 0.32 | 0.35 | 0.19 | 0.08 |
| ***010301*** | 0.68 | 0.08 | 0.44 | 0.14 | 0.47 | 0.17 | 0.71 | 0.58 | 0.09 | 0.40 | 0.33 | 0.90 | 0.22 | 0.33 |
| ***010302*** | 0.12 | 0.30 | 0.01 | 0.24 | 0.20 | 0.00 | 0.51 | 0.00 | 0.21 | 0.00 | 0.51 | 0.18 | 0.92 | 0.22 |
| ***010303*** | 0.64 | 0.05 | 0.69 | 0.09 | 0.54 | 0.40 | 0.35 | 0.66 | 0.17 | 0.25 | 0.29 | 0.95 | 0.55 | 0.73 |
| ***010304*** | 0.30 | 0.57 | 0.00 | 0.05 | 0.09 | 0.08 | 0.35 | 0.08 | 0.39 | 0.11 | 0.16 | 0.17 | 0.21 | 0.08 |
| ***010305*** | 0.82 | 0.12 | 0.05 | 0.39 | 0.33 | 0.15 | 0.17 | 0.03 | 0.63 | 0.02 | 0.22 | 0.02 | 0.63 | 0.10 |
| ***010401*** | 0.19 | 0.67 | 0.58 | 0.83 | 0.52 | 0.66 | 0.16 | 0.71 | 0.58 | 0.16 | 0.05 | 0.03 | 0.01 | 0.57 |
| ***010402*** | 0.03 | 0.11 | 0.00 | 0.65 | 0.11 | 0.00 | 0.01 | 0.07 | 0.01 | 0.00 | 0.76 | 0.41 | 0.06 | 0.15 |
| ***010403*** | 0.44 | 0.31 | 0.48 | 0.78 | 0.88 | 0.18 | 0.07 | 0.77 | 0.90 | 0.92 | 0.54 | 0.16 | 0.20 | 0.82 |
| ***010404*** | 0.38 | 0.13 | 0.59 | 0.28 | 0.04 | 0.03 | 0.00 | 0.34 | 0.21 | 0.07 | 0.40 | 0.27 | 0.13 | 0.10 |
| ***010405*** | 0.01 | 0.20 | 0.22 | 0.06 | 0.00 | 0.38 | 0.01 | 0.33 | 0.47 | 0.61 | 0.08 | 0.46 | 0.08 | 0.52 |
| ***010501*** | 0.06 | 0.84 | 0.15 | 0.56 | 0.01 | 0.30 | 0.95 | 0.17 | 0.07 | 0.05 | 0.29 | 0.42 | 0.24 | 0.15 |
| ***010502*** | 0.05 | 0.33 | 0.74 | 0.05 | 0.36 | 0.18 | 0.06 | 0.24 | 0.38 | 0.43 | 0.04 | 0.17 | 0.19 | 0.01 |
| ***010503*** | 0.15 | 0.96 | 0.63 | 0.36 | 0.23 | 0.33 | 0.92 | 0.14 | 0.16 | 0.09 | 0.43 | 0.18 | 0.68 | 0.44 |
| ***010504*** | 0.25 | 0.06 | 0.53 | 0.76 | 0.74 | 0.06 | 0.04 | 0.06 | 0.10 | 0.14 | 0.26 | 0.26 | 0.28 | 0.06 |
| ***010505*** | 0.26 | 0.47 | 0.26 | 0.90 | 0.49 | 0.80 | 0.34 | 0.01 | 0.07 | 0.53 | 0.61 | 0.15 | 0.78 | 0.25 |
| ***010601*** | 0.85 | 0.36 | 0.10 | 0.72 | 0.83 | 0.77 | 0.20 | 0.11 | 0.33 | 0.30 | 0.16 | 0.92 | 0.44 | 0.25 |
| ***010602*** | 0.51 | 0.87 | 0.04 | 0.78 | 0.77 | 0.05 | 0.44 | 0.07 | 0.70 | 0.21 | 0.08 | 0.78 | 0.49 | 0.20 |

| ID | 322 3 | 111 2 | 211 3 | 212 2 | 212 3 | 221 2 | 221 3 | 222 2 | 222 3 | 211 2 | 112 1 | 121 1 | 122 1 | 211 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01060 3 | 0.24 | 0.65 | 0.30 | 0.94 | 0.44 | 0.45 | 0.44 | 0.68 | 0.15 | 0.40 | 0.50 | 0.95 | 0.35 | 0.19 |
| 01060 4 | 0.31 | 0.95 | 0.75 | 0.83 | 0.29 | 0.88 | 0.28 | 0.16 | 0.47 | 0.18 | 0.32 | 0.06 | 0.28 | 0.31 |
| 01060 5 | 0.34 | 0.53 | 0.08 | 0.46 | 0.22 | 0.39 | 0.25 | 0.73 | 0.15 | 0.26 | 0.95 | 0.41 | 0.80 | 0.51 |
| 01070 1 | 0.25 | 0.14 | 0.29 | 0.88 | 0.87 | 0.71 | 0.08 | 0.73 | 0.02 | 0.43 | 0.32 | 0.42 | 0.36 | 0.23 |
| 01070 2 | 0.53 | 0.16 | 0.85 | 0.54 | 0.83 | 0.74 | 0.58 | 0.15 | 0.02 | 0.03 | 0.52 | 0.73 | 0.40 | 0.48 |
| 01070 3 | 0.03 | 0.53 | 0.31 | 0.49 | 0.32 | 0.09 | 0.42 | 0.30 | 0.89 | 0.46 | 0.64 | 0.27 | 0.13 | 0.42 |
| 01070 4 | 0.85 | 0.90 | 0.30 | 0.25 | 0.08 | 0.18 | 0.39 | 0.46 | 0.58 | 0.62 | 0.81 | 0.89 | 0.24 | 0.35 |
| 01070 5 | 0.64 | 0.63 | 0.38 | 0.00 | 0.04 | 0.28 | 0.09 | 0.36 | 0.01 | 0.61 | 0.82 | 0.39 | 0.27 | 0.39 |
| 01080 1 | 0.92 | 0.16 | 0.62 | 0.82 | 0.55 | 0.64 | 0.66 | 0.30 | 0.11 | 0.04 | 0.17 | 0.58 | 0.58 | 0.70 |
| 01080 2 | 0.12 | 0.49 | 0.22 | 0.13 | 0.69 | 0.30 | 0.79 | 0.70 | 0.47 | 0.29 | 0.10 | 0.03 | 0.38 | 0.53 |
| 01080 3 | 0.13 | 0.52 | 0.35 | 0.08 | 0.41 | 0.02 | 0.41 | 0.26 | 0.19 | 0.18 | 0.11 | 0.55 | 0.49 | 0.09 |
| 01080 4 | 0.50 | 0.69 | 0.71 | 0.62 | 0.60 | 0.06 | 0.60 | 0.16 | 0.35 | 0.50 | 0.11 | 0.45 | 0.70 | 0.26 |
| 01080 5 | 0.78 | 0.23 | 0.15 | 0.71 | 0.97 | 0.07 | 0.56 | 0.04 | 0.10 | 0.77 | 0.13 | 0.91 | 0.75 | 0.83 |
| 01090 1 | 0.11 | 0.58 | 0.88 | 0.40 | 0.62 | 0.80 | 0.22 | 0.09 | 0.73 | 0.35 | 0.18 | 0.69 | 0.64 | 0.21 |
| 01090 2 | 0.47 | 0.69 | 0.35 | 0.37 | 0.13 | 0.37 | 0.29 | 0.62 | 0.05 | 0.80 | 0.08 | 0.51 | 0.07 | 0.59 |
| 01090 3 | 0.31 | 0.60 | 0.88 | 0.03 | 0.90 | 0.28 | 0.69 | 0.10 | 0.83 | 0.45 | 0.73 | 0.23 | 0.26 | 0.66 |
| 01090 4 | 0.42 | 0.17 | 0.37 | 0.23 | 0.47 | 0.02 | 0.54 | 0.33 | 0.17 | 0.66 | 0.83 | 0.59 | 0.58 | 0.63 |
| 01090 5 | 0.48 | 0.72 | 0.74 | 0.16 | 0.65 | 0.47 | 0.02 | 0.52 | 0.65 | 0.28 | 0.15 | 0.34 | 0.10 | 0.47 |
| 01100 1 | 0.27 | 0.24 | 0.12 | 0.31 | 0.40 | 0.13 | 0.95 | 0.70 | 0.89 | 0.60 | 0.46 | 0.43 | 0.46 | 0.89 |

| ID | 322 3 | 111 2 | 211 3 | 212 2 | 212 3 | 221 2 | 221 3 | 222 2 | 222 3 | 211 2 | 112 1 | 121 1 | 122 1 | 211 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **01100 2** | 0.37 | 0.17 | 0.50 | 0.25 | 0.37 | 0.05 | 0.59 | 0.56 | 0.24 | 0.59 | 0.14 | 0.60 | 0.44 | 0.12 |
| **01100 3** | 0.23 | 0.56 | 0.53 | 0.39 | 0.95 | 0.94 | 0.10 | 0.96 | 0.40 | 0.74 | 0.93 | 0.24 | 0.15 | 0.69 |
| **01100 4** | 0.89 | 0.77 | 0.19 | 0.29 | 0.24 | 0.23 | 0.45 | 0.30 | 0.52 | 0.21 | 0.54 | 0.82 | 0.32 | 0.02 |
| **01100 5** | 0.08 | 0.06 | 0.00 | 0.00 | 0.35 | 0.13 | 0.68 | 0.62 | 0.00 | 0.23 | 0.42 | 0.07 | 0.10 | 0.04 |
| **01110 1** | 0.84 | 0.86 | 0.16 | 0.37 | 0.44 | 0.58 | 0.59 | 0.75 | 0.27 | 0.00 | 0.77 | 0.17 | 0.92 | 0.09 |
| **01110 2** | 0.12 | 0.49 | 0.22 | 0.13 | 0.69 | 0.30 | 0.79 | 0.70 | 0.47 | 0.29 | 0.10 | 0.03 | 0.38 | 0.53 |
| **01110 3** | 0.08 | 0.20 | 0.52 | 0.67 | 0.11 | 0.76 | 0.78 | 0.92 | 0.03 | 0.24 | 0.35 | 0.71 | 0.83 | 0.62 |
| **01110 4** | 0.52 | 0.55 | 0.49 | 0.50 | 0.75 | 0.41 | 0.62 | 0.14 | 0.59 | 0.67 | 0.08 | 0.45 | 0.61 | 0.04 |
| **01110 5** | 0.72 | 0.31 | 0.22 | 0.43 | 0.12 | 0.23 | 0.33 | 0.20 | 0.41 | 0.30 | 0.68 | 0.41 | 0.67 | 0.28 |
| **01120 1** | 0.40 | 0.54 | 0.18 | 0.67 | 0.97 | 0.94 | 0.46 | 0.08 | 0.68 | 0.48 | 0.63 | 0.10 | 0.60 | 0.02 |
| **01120 2** | 0.68 | 0.17 | 0.18 | 0.10 | 0.47 | 0.31 | 0.54 | 0.71 | 0.11 | 0.59 | 0.24 | 0.41 | 0.60 | 0.88 |
| **01120 3** | 0.09 | 0.72 | 0.36 | 0.23 | 0.70 | 0.96 | 0.49 | 0.05 | 0.70 | 0.12 | 0.49 | 0.22 | 0.29 | 0.46 |
| **01120 4** | 0.12 | 0.30 | 0.68 | 0.41 | 0.28 | 0.14 | 0.28 | 0.22 | 0.08 | 0.59 | 0.75 | 0.73 | 0.26 | 0.45 |
| **01120 5** | 0.29 | 0.14 | 0.57 | 0.42 | 0.48 | 0.23 | 0.70 | 0.34 | 0.65 | 0.03 | 0.48 | 0.07 | 0.36 | 0.09 |
| **02130 1** | 0.19 | 0.01 | 0.00 | 0.42 | 0.04 | 0.07 | 0.34 | 0.85 | 0.11 | 0.13 | 0.06 | 0.33 | 0.51 | 0.08 |
| **02130 3** | 0.21 | 0.01 | 0.04 | 0.03 | 0.15 | 0.17 | 0.11 | 0.37 | 0.04 | 0.03 | 0.07 | 0.42 | 0.28 | 0.02 |
| **02130 4** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| **02130 5** | 0.00 | 0.00 | 0.01 | n/d | 0.00 | 0.00 | 0.04 | n/d | 0.00 | 0.00 | n/d | 0.00 | n/d | n/d |
| **02140 1** | 0.11 | 0.05 | 0.05 | 0.14 | 0.38 | 0.28 | 0.20 | 0.13 | 0.04 | 0.74 | 0.00 | 0.19 | 0.57 | 0.20 |

| ID | 322 3 | 111 2 | 211 3 | 212 2 | 212 3 | 221 2 | 221 3 | 222 2 | 222 3 | 211 2 | 112 1 | 121 1 | 122 1 | 211 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 021403 | 0.50 | 0.18 | 0.01 | 0.16 | 0.63 | 0.77 | 0.17 | 0.42 | 0.03 | 0.79 | 0.01 | 0.06 | 0.57 | 0.06 |
| 021404 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| 021405 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.01 | n/d | 0.00 | 0.00 | n/d | 0.00 | n/d | 0.00 |
| 021501 | 0.00 | 0.11 | 0.57 | 0.80 | 0.11 | 0.00 | 0.76 | 0.90 | 0.10 | 0.53 | 0.15 | 0.42 | 0.09 | 0.18 |
| 021502 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| 021503 | 0.10 | 0.28 | 0.40 | 0.32 | 0.50 | 0.47 | 0.12 | 0.15 | 0.35 | 0.33 | 0.00 | 0.15 | 0.11 | 0.24 |
| 021504 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 021505 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 030101 | 0.07 | 0.50 | 0.55 | 0.83 | 0.62 | 0.61 | 0.76 | 0.31 | 0.08 | 0.13 | 0.38 | 0.06 | 0.40 | 0.61 |
| 030102 | 0.00 | 0.02 | 0.13 | 0.14 | 0.02 | 0.06 | 0.89 | 0.66 | 0.22 | 0.06 | 0.09 | 0.54 | 0.07 | 0.83 |
| 030103 | 0.20 | 0.71 | 0.03 | 0.19 | 0.15 | 0.97 | 0.81 | 0.23 | 0.40 | 0.11 | 0.87 | 0.48 | 0.70 | 0.94 |
| 030104 | 0.32 | 0.05 | 0.17 | 0.11 | 0.19 | 0.05 | 0.06 | 0.91 | 0.17 | 0.71 | 0.44 | 0.12 | 0.11 | 0.86 |
| 030105 | 0.11 | 0.50 | 0.04 | 0.68 | 0.77 | 0.35 | 0.97 | 0.47 | 0.35 | 0.11 | 0.09 | 0.37 | 0.00 | 0.26 |
| 030106 | 0.75 | 0.27 | 0.89 | 0.69 | 0.04 | 0.21 | 0.67 | 0.67 | 0.86 | 0.71 | 0.07 | 0.80 | 0.92 | 0.26 |
| 030107 | 0.38 | 0.04 | 0.31 | 0.18 | 0.74 | 0.43 | 0.30 | 0.88 | 0.09 | 0.68 | 0.25 | 0.31 | 0.69 | 0.56 |
| 031201 | 0.02 | 0.70 | 0.42 | 0.17 | 0.29 | 0.20 | 0.22 | 0.62 | 0.06 | 0.10 | 0.28 | 0.19 | 0.16 | 0.06 |
| 031202 | 0.10 | 0.08 | 0.10 | 0.02 | 0.10 | 0.00 | 0.16 | 0.07 | 0.11 | 0.02 | 0.27 | 0.18 | 0.34 | 0.00 |
| 031203 | 0.69 | 0.35 | 0.24 | 0.32 | 0.03 | 0.52 | 0.21 | 0.34 | 0.51 | 0.27 | 0.00 | 0.05 | 0.22 | 0.01 |
| 031204 | 0.02 | 0.00 | 0.01 | 0.24 | 0.09 | 0.00 | 0.04 | 0.29 | 0.00 | 0.17 | 0.21 | 0.00 | 0.03 | 0.03 |

| ID | 322 3 | 111 2 | 211 3 | 212 2 | 212 3 | 221 2 | 221 3 | 222 2 | 222 3 | 211 2 | 112 1 | 121 1 | 122 1 | 211 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 031205 | 0.67 | 0.27 | 0.02 | 0.41 | 0.88 | 0.06 | 0.49 | 0.05 | 0.82 | 0.09 | 0.00 | 0.00 | 0.11 | 0.10 |
| 031206 | 0.74 | 0.53 | 0.60 | 0.86 | 0.25 | 0.66 | 0.54 | 0.59 | 0.57 | 0.31 | 0.28 | 0.27 | 0.20 | 0.03 |
| 031207 | 0.09 | 0.76 | 0.57 | 0.01 | 0.03 | 0.03 | 0.20 | 0.02 | 0.00 | 0.20 | 0.12 | 0.30 | 0.64 | 0.53 |
| 040101 | 0.36 | 0.04 | 0.75 | 0.78 | 0.26 | 0.80 | 0.16 | 0.29 | 0.03 | 0.92 | 0.33 | 0.54 | 0.13 | 0.86 |
| 040102 | 0.00 | 0.05 | 0.30 | 0.24 | 0.10 | 0.01 | 0.99 | 0.14 | 0.40 | 0.10 | 0.55 | 0.08 | 0.80 | 0.51 |
| 040103 | 0.14 | 0.27 | 0.17 | 0.47 | 0.23 | 0.85 | 0.22 | 0.06 | 0.11 | 0.02 | 0.86 | 0.01 | 0.67 | 0.38 |
| 040104 | 0.47 | 0.20 | 0.04 | 0.71 | 0.60 | 0.25 | 0.57 | 0.19 | 0.05 | 0.93 | 0.28 | 0.00 | 0.26 | 0.63 |
| 040105 | 0.08 | 0.88 | 0.21 | 0.21 | 0.63 | 0.53 | 0.76 | 0.73 | 0.40 | 0.56 | 0.43 | 0.14 | 0.27 | 0.78 |
| 040106 | 0.34 | 0.10 | 0.78 | 0.09 | 0.31 | 0.58 | 0.38 | 0.83 | 0.28 | 0.96 | 0.53 | 0.01 | 0.19 | 0.15 |
| 040107 | 0.55 | 0.89 | 0.56 | 0.64 | 0.78 | 0.36 | 0.61 | 0.86 | 0.38 | 0.70 | 0.37 | 0.44 | 0.69 | 0.05 |
| 041201 | 0.51 | 0.21 | 0.10 | 0.18 | 0.59 | 0.09 | 0.48 | 0.68 | 0.04 | 0.11 | 0.35 | 0.13 | 0.38 | 0.71 |
| 041202 | 0.04 | 0.00 | 0.07 | 0.00 | 0.64 | 0.00 | 0.34 | 0.35 | 0.13 | 0.30 | 0.01 | 0.03 | 0.51 | 0.43 |
| 041203 | 0.51 | 0.16 | 0.10 | 0.09 | 0.03 | 0.14 | 0.73 | 0.35 | 0.76 | 0.64 | 0.06 | 0.16 | 0.26 | 0.65 |
| 041204 | 0.01 | 0.01 | 0.04 | 0.28 | 0.15 | 0.10 | 0.02 | 0.11 | 0.03 | 0.74 | 0.00 | 0.01 | 0.11 | 0.33 |
| 041205 | 0.88 | 0.05 | 0.02 | 0.55 | 0.40 | 0.00 | 0.18 | 0.04 | 0.65 | 0.28 | 0.25 | 0.01 | 0.49 | 0.19 |
| 041206 | 0.66 | 0.43 | 0.32 | 0.32 | 0.08 | 0.11 | 0.69 | 0.18 | 0.70 | 0.47 | 0.10 | 0.07 | 0.68 | 0.11 |
| 041207 | 0.06 | 0.87 | 0.69 | 0.08 | 0.05 | 0.12 | 0.12 | 0.49 | 0.01 | 0.10 | 0.46 | 0.74 | 0.25 | 0.08 |
| 051601 | 0.77 | 0.76 | 0.66 | 0.03 | 0.29 | 0.41 | 0.42 | 0.20 | 0.25 | 0.25 | 0.11 | 0.79 | 0.43 | 0.95 |
| 051602 | 0.00 | 0.02 | 0.05 | 0.00 | 0.06 | 0.00 | 0.77 | 0.67 | 0.11 | 0.13 | 0.49 | 0.09 | 0.03 | 0.71 |

| ID | 3223 | 1112 | 2113 | 2122 | 2123 | 2212 | 2213 | 2222 | 2223 | 2112 | 1121 | 1211 | 1221 | 2111 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **051603** | 0.69 | 0.98 | 0.89 | 0.11 | 0.02 | 0.04 | 0.56 | 0.12 | 0.61 | 0.11 | 0.21 | 0.09 | 0.21 | 0.43 |
| **051604** | 0.03 | 0.01 | 0.04 | 0.00 | 0.00 | 0.38 | 0.07 | 0.01 | 0.00 | 0.56 | 0.00 | 0.11 | 0.13 | 0.70 |
| **051605** | 0.72 | 0.94 | 0.04 | 0.69 | 0.23 | 0.17 | 0.26 | 0.75 | 0.02 | 0.73 | 0.73 | 0.09 | 0.48 | 0.63 |
| **051701** | 0.09 | 0.24 | 0.04 | 0.29 | 0.01 | 0.33 | 0.00 | 0.05 | 0.18 | 0.15 | 0.97 | 0.03 | 0.61 | 0.66 |
| **051702** | 0.00 | 0.94 | n/d | 0.07 | 0.25 | 0.01 | 0.56 | 0.46 | 0.01 | 0.08 | 0.66 | 0.84 | 0.55 | 0.42 |
| **051703** | 0.41 | 0.12 | 0.04 | 0.77 | 0.01 | 0.24 | 0.00 | 0.03 | 0.17 | 0.21 | 0.60 | 0.12 | 0.80 | 0.31 |
| **051704** | 0.01 | n/d | 0.02 | n/d | 0.02 | 0.01 | 0.00 | 0.28 | 0.00 | 0.06 | 0.74 | 0.05 | 0.23 | 0.48 |
| **051705** | 0.12 | 0.36 | 0.01 | 0.41 | 0.08 | 0.04 | 0.01 | 0.03 | 0.04 | 0.22 | 0.26 | 0.64 | 0.42 | 0.01 |
| **061601** | 0.72 | 0.36 | 0.69 | 0.50 | 0.05 | 0.22 | 0.19 | 0.41 | 0.73 | 0.78 | 0.30 | 0.61 | 0.13 | 0.22 |
| **061701** | 0.22 | 0.28 | 0.16 | 0.33 | 0.00 | 0.03 | 0.02 | 0.16 | 0.62 | 0.24 | 0.15 | 0.04 | 0.93 | 0.46 |
| **071601** | 0.32 | 0.04 | 0.42 | 0.20 | 0.43 | 0.01 | 0.95 | 0.36 | 0.42 | 0.15 | 0.27 | 0.10 | 0.08 | 0.77 |
| **071701** | 0.00 | 0.19 | 0.00 | 0.87 | n/d | 0.18 | n/d | 0.69 | 0.00 | 0.12 | 0.27 | 0.92 | 0.05 | 0.63 |
| **081801** | 0.16 | 0.71 | 0.03 | 0.22 | 0.15 | 0.01 | 0.12 | 0.14 | 0.30 | 0.35 | 0.00 | 0.42 | 0.10 | 0.27 |
| **081802** | 0.48 | 0.00 | 0.00 | 0.27 | 0.55 | 0.00 | 0.00 | 0.16 | 0.00 | 0.00 | 0.40 | 0.00 | 0.14 | 0.00 |
| **081803** | 0.19 | 0.82 | 0.87 | 0.13 | 0.33 | 0.18 | 0.02 | 0.95 | 0.02 | 0.22 | 0.01 | 0.00 | 0.30 | 0.09 |
| **081804** | 0.34 | 0.11 | 0.62 | 0.00 | 0.00 | 0.26 | 0.32 | 0.00 | 0.10 | 0.07 | 0.05 | 0.14 | 0.00 | 0.06 |
| **081805** | 0.05 | 0.00 | 0.01 | 0.03 | 0.77 | 0.00 | 0.00 | 0.00 | 0.57 | 0.00 | 0.29 | 0.00 | 0.00 | 0.00 |
| **081901** | 0.78 | 0.03 | 0.67 | 0.83 | 0.32 | 0.98 | 0.13 | 0.87 | 0.17 | 0.18 | 0.35 | 0.19 | 0.49 | 0.46 |
| **081902** | 0.93 | n/d | n/d | 0.20 | 0.05 | n/d | n/d | 0.23 | 0.30 | n/d | 0.93 | n/d | n/d | n/d |

| ID | 322 3 | 111 2 | 211 3 | 212 2 | 212 3 | 221 2 | 221 3 | 222 2 | 222 3 | 211 2 | 112 1 | 121 1 | 122 1 | 211 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **081903** | 0.90 | 0.66 | 0.47 | 0.30 | 0.89 | 0.36 | 0.77 | 0.33 | 0.41 | 0.80 | 0.22 | 0.93 | 0.41 | 0.43 |
| **081904** | 0.01 | 0.00 | 0.27 | 0.56 | 0.06 | 0.01 | 0.00 | n/d | 0.57 | 0.00 | 0.01 | 0.00 | n/d | 0.05 |
| **081905** | 0.01 | n/d | n/d | 0.03 | 0.06 | n/d | n/d | 0.00 | 0.22 | n/d | 0.21 | n/d | 0.00 | n/d |
| **082002** | n/d | n/d | n/d | 0.18 | 0.36 | n/d | n/d | n/d | 0.87 | n/d | 0.55 | n/d | n/d | n/d |
| **082003** | 0.38 | 0.74 | 0.28 | 0.50 | 0.93 | 0.38 | 0.64 | 0.61 | 0.72 | 0.18 | 0.03 | 0.24 | 0.30 | 0.14 |
| **082004** | 0.00 | n/d | 0.35 | 0.03 | 0.28 | n/d | 0.00 | n/d | 0.00 | n/d | 0.03 | n/d | n/d | n/d |
| **082005** | 0.00 | n/d | n/d | 0.07 | 0.01 | n/d | n/d | n/d | 0.00 | n/d | 0.00 | n/d | n/d | n/d |
| **082102** | 0.13 | n/d | n/d | n/d | 0.41 | n/d | n/d | n/d | 0.25 | n/d | n/d | n/d | n/d | n/d |
| **082103** | 0.17 | 0.17 | 0.53 | 0.42 | 0.16 | 0.11 | 0.56 | 0.02 | 0.34 | 0.50 | 0.61 | 0.00 | 0.01 | 0.42 |
| **082104** | n/d | n/d | 0.04 | n/d | 0.00 | n/d | 0.01 | n/d | 0.27 | n/d | n/d | n/d | n/d | n/d |
| **082105** | 0.00 | n/d | n/d | 0.00 | 0.29 | n/d | n/d | 0.00 | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d |
| **082201** | 0.06 | 0.01 | 0.03 | 0.60 | 0.02 | 0.00 | 0.57 | 0.38 | 0.11 | 0.26 | 0.58 | 0.02 | 0.56 | 0.02 |
| **082202** | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **082203** | 0.51 | 0.96 | 0.96 | 0.44 | 0.97 | 0.49 | 0.06 | 0.18 | 0.53 | 0.01 | 0.56 | 0.01 | 0.56 | 0.09 |
| **082204** | 0.00 | 0.00 | 0.02 | 0.00 | 0.13 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **082205** | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **082302** | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 |
| **082303** | 0.12 | 0.00 | 0.13 | 0.36 | 0.53 | 0.11 | 0.00 | 0.39 | 0.05 | 0.31 | 0.74 | 0.11 | 0.17 | 0.01 |
| **082304** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| ID | 3223 | 1112 | 2113 | 2122 | 2123 | 2212 | 2213 | 2222 | 2223 | 2112 | 1121 | 1211 | 1221 | 2111 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***082305*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 |
| ***082402*** | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082403*** | 0.17 | 0.03 | 0.34 | 0.21 | 0.13 | 0.23 | 0.19 | 0.00 | 0.06 | 0.16 | 0.30 | 0.00 | 0.00 | 0.19 |
| ***082404*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082405*** | n/d | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082501*** | 0.06 | 0.01 | 0.03 | 0.08 | 0.02 | 0.00 | 0.16 | 0.38 | 0.11 | 0.26 | 0.03 | 0.05 | 0.56 | 0.02 |
| ***082502*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082503*** | 0.52 | 0.96 | 0.96 | 0.44 | 0.89 | 0.00 | 0.06 | 0.26 | 0.05 | 0.04 | 0.56 | 0.01 | 0.56 | 0.09 |
| ***082504*** | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082505*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082602*** | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082603*** | 0.12 | 0.06 | 0.13 | 0.36 | 0.53 | 0.11 | 0.00 | 0.56 | 0.05 | 0.31 | 0.75 | 0.12 | 0.17 | 0.01 |
| ***082604*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082605*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 |
| ***082702*** | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082703*** | 0.17 | 0.02 | 0.05 | 0.00 | 0.13 | 0.23 | 0.19 | 0.00 | 0.06 | 0.16 | 0.30 | 0.00 | 0.00 | 0.19 |
| ***082704*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082705*** | n/d | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082801*** | 0.14 | 0.37 | 0.06 | 0.53 | 0.05 | 0.83 | 0.59 | 0.50 | 0.73 | 0.46 | 0.62 | 0.34 | 0.14 | 0.10 |

| *ID* | ***3223*** | ***1112*** | ***2113*** | ***2122*** | ***2123*** | ***2212*** | ***2213*** | ***2222*** | ***2223*** | ***2112*** | ***1121*** | ***1211*** | ***1221*** | ***2111*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***082802*** | 0.09 | 0.00 | 0.00 | 0.26 | 0.18 | 0.00 | 0.00 | 0.89 | 0.01 | 0.00 | 0.87 | 0.00 | 0.00 | 0.00 |
| ***082803*** | 0.09 | 0.53 | 0.50 | 0.67 | 0.54 | 0.68 | 0.33 | 0.24 | 0.79 | 0.36 | 0.38 | 0.17 | 0.93 | 0.01 |
| ***082804*** | 0.34 | 0.02 | 0.19 | 0.00 | 0.19 | 0.31 | 0.00 | 0.00 | 0.40 | 0.00 | 0.11 | 0.01 | 0.00 | 0.26 |
| ***082805*** | 0.17 | 0.00 | 0.00 | 0.25 | 0.04 | 0.00 | 0.00 | 0.02 | 0.15 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| ***082901*** | 0.01 | 0.21 | 0.19 | 0.28 | 0.49 | 0.18 | 0.10 | 0.62 | 0.11 | 0.03 | 0.28 | 0.00 | 0.20 | 0.00 |
| ***082902*** | 0.11 | n/d | n/d | 0.99 | 0.18 | n/d | n/d | 0.05 | 0.35 | n/d | 0.03 | n/d | n/d | n/d |
| ***082903*** | 0.31 | 0.13 | 0.07 | 0.09 | 0.02 | 0.01 | 0.72 | 0.06 | 0.22 | 0.98 | 0.83 | 0.00 | 0.03 | 0.01 |
| ***082904*** | 0.04 | 0.00 | 0.00 | 0.21 | 0.00 | 0.00 | 0.00 | n/d | 0.01 | 0.00 | 0.03 | 0.00 | n/d | 0.01 |
| ***082905*** | 0.00 | n/d | n/d | 0.00 | 0.14 | n/d | n/d | 0.00 | 0.01 | n/d | 0.01 | n/d | 0.00 | n/d |
| ***083002*** | n/d | n/d | n/d | 0.26 | 0.33 | n/d | n/d | 0.00 | 0.26 | n/d | n/d | n/d | n/d | n/d |
| ***083003*** | 0.36 | 0.13 | 0.08 | 0.10 | 0.40 | 0.00 | 0.20 | 0.06 | 0.92 | 0.35 | 0.71 | 0.00 | 0.01 | 0.00 |
| ***083004*** | n/d | n/d | 0.02 | 0.00 | 0.04 | n/d | 0.02 | n/d | 0.00 | n/d | n/d | n/d | n/d | n/d |
| ***083005*** | 0.00 | n/d | n/d | n/d | 0.63 | n/d | n/d | n/d | 0.00 | n/d | n/d | n/d | n/d | n/d |
| ***083102*** | 0.00 | n/d | n/d | n/d | 0.16 | n/d | n/d | n/d | 0.00 | n/d | n/d | n/d | n/d | n/d |
| ***083103*** | 0.00 | 0.00 | 0.14 | 0.63 | 0.26 | 0.01 | 0.00 | 0.05 | 0.42 | 0.00 | 0.49 | 0.00 | 0.00 | 0.00 |
| ***083104*** | n/d | n/d | 0.12 | n/d | 0.40 | 0.00 | 0.06 | n/d | 0.01 | n/d | n/d | n/d | n/d | n/d |
| ***083105*** | 0.00 | n/d | n/d | 0.00 | 0.01 | n/d | n/d | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d |
| ***090101*** | 0.18 | 0.45 | 0.13 | 0.91 | 0.12 | 0.58 | 0.65 | 0.12 | 0.10 | 0.16 | 0.73 | 0.57 | 0.08 | 0.90 |
| ***090102*** | 0.00 | 0.13 | 0.15 | 0.41 | 0.02 | 0.05 | 0.79 | 0.37 | 0.31 | 0.07 | 0.16 | 0.48 | 0.56 | 0.46 |

| ID | 322 3 | 111 2 | 211 3 | 212 2 | 212 3 | 221 2 | 221 3 | 222 2 | 222 3 | 211 2 | 112 1 | 121 1 | 122 1 | 211 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 090103 | 0.60 | 0.46 | 0.84 | 0.60 | 0.72 | 0.08 | 0.48 | 0.50 | 0.36 | 0.47 | 0.84 | 0.83 | 0.51 | 0.07 |
| 090104 | 0.36 | 0.00 | 0.08 | 0.13 | 0.05 | 0.51 | 0.87 | 0.06 | 0.15 | 0.36 | 0.44 | 0.26 | 0.21 | 0.68 |
| 090105 | 0.07 | 0.22 | 0.06 | 0.24 | 0.10 | 0.53 | 0.53 | 0.39 | 0.08 | 0.24 | 0.56 | 0.31 | 0.23 | 0.85 |
| 091201 | 0.28 | 0.03 | 0.97 | 0.00 | 0.78 | 0.27 | 0.41 | 0.17 | 0.87 | 0.01 | 0.16 | 0.96 | 0.42 | 0.37 |
| 091202 | 0.01 | 0.00 | 0.31 | 0.01 | 0.53 | 0.01 | 0.21 | 0.68 | 0.26 | 0.73 | 0.00 | 0.16 | 0.45 | 0.89 |
| 091203 | 0.49 | 0.65 | 0.72 | 0.02 | 0.02 | 0.72 | 0.08 | 0.14 | 0.22 | 0.18 | 0.48 | 0.15 | 0.20 | 0.77 |
| 091204 | 0.03 | 0.00 | 0.01 | 0.00 | 0.02 | 0.04 | 0.10 | 0.56 | 0.00 | 0.52 | 0.02 | 0.01 | 0.38 | 0.15 |
| 091205 | 0.67 | 0.42 | 0.03 | 0.06 | 0.31 | 0.24 | 0.00 | 0.53 | 0.01 | 0.00 | 0.37 | 0.18 | 0.17 | 0.28 |
| 103201 | 0.17 | 0.10 | 0.80 | 0.13 | 0.82 | 0.25 | 0.59 | 0.69 | 0.39 | 0.94 | 0.23 | 0.08 | 0.65 | 0.18 |
| 103202 | 0.23 | 0.48 | 0.00 | 0.48 | 0.37 | 0.92 | 0.15 | 0.49 | 0.82 | 0.04 | 0.02 | 0.55 | 0.85 | 0.66 |
| 103203 | 0.00 | 0.01 | 0.23 | 0.86 | 0.06 | 0.10 | 0.66 | 0.53 | 0.37 | 0.47 | 0.13 | 0.77 | 0.29 | 0.13 |
| 103204 | 0.43 | 0.76 | 0.77 | 0.59 | 0.39 | 0.16 | 0.31 | 0.30 | 0.45 | 0.97 | 0.96 | 0.22 | 0.05 | 0.08 |
| 103205 | 0.67 | 0.51 | 0.16 | 0.27 | 0.27 | 0.45 | 0.24 | 0.18 | 0.60 | 0.22 | 0.22 | 0.16 | 0.16 | 0.01 |
| 103301 | 0.21 | 0.02 | 0.02 | 0.89 | 0.84 | 0.13 | 0.00 | 0.27 | 0.49 | 0.21 | 0.83 | 0.29 | 0.24 | 0.49 |
| 103302 | 0.82 | 0.58 | n/d | 0.42 | 0.32 | 0.54 | 0.63 | 0.11 | 0.08 | 0.49 | 0.07 | 0.92 | 0.22 | 0.71 |
| 103303 | 0.08 | 0.20 | 0.01 | 0.37 | 0.90 | 0.08 | 0.00 | 0.80 | 0.00 | 0.20 | 0.29 | 0.09 | 0.04 | 0.25 |
| 103304 | 0.04 | 0.09 | 0.21 | 0.08 | 0.06 | 0.46 | 0.07 | 0.06 | 0.29 | 0.15 | 0.35 | 0.63 | 0.74 | 0.47 |
| 103305 | 0.28 | 0.11 | 0.29 | 0.76 | 0.81 | 0.24 | 0.68 | 0.51 | 0.51 | 0.20 | 0.57 | 0.20 | 0.71 | 0.51 |
| 110101 | 0.17 | 0.21 | 0.25 | 0.67 | 0.04 | 0.10 | 0.09 | 0.16 | 0.83 | 0.01 | 0.12 | 0.82 | 0.07 | 0.54 |

| *ID* | ***3223*** | ***1112*** | ***2113*** | ***2122*** | ***2123*** | ***2212*** | ***2213*** | ***2222*** | ***2223*** | ***2112*** | ***1121*** | ***1211*** | ***1221*** | ***2111*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***110102*** | 0.01 | 0.02 | 0.83 | 0.20 | 0.18 | 0.00 | 0.55 | 0.48 | 0.18 | 0.01 | 0.70 | 0.35 | 0.06 | 0.04 |
| ***110103*** | 0.08 | 0.56 | 0.16 | 0.47 | 0.41 | 0.83 | 0.39 | 0.14 | 0.78 | 0.92 | 0.00 | 0.77 | 0.04 | 0.92 |
| ***110104*** | 0.03 | 0.30 | 0.04 | 0.08 | 0.18 | 0.04 | 0.91 | 0.73 | 0.05 | 0.59 | 0.46 | 0.04 | 0.04 | 0.58 |
| ***110105*** | 0.17 | 0.30 | 0.00 | 0.12 | 0.92 | 0.40 | 0.13 | 0.50 | 0.44 | 0.04 | 0.46 | 0.01 | 0.40 | 0.44 |
| ***111201*** | 0.02 | 0.85 | 0.69 | 0.37 | 0.09 | 0.47 | 0.39 | 0.55 | 0.02 | 0.07 | 0.26 | 0.10 | 0.25 | 0.01 |
| ***111202*** | 0.05 | 0.13 | 0.06 | 0.00 | 0.65 | 0.01 | 0.08 | 0.16 | 0.01 | 0.00 | 0.02 | 0.53 | 0.00 | 0.01 |
| ***111203*** | 0.21 | 0.67 | 0.66 | 0.30 | 0.06 | 0.29 | 0.70 | 0.27 | 0.53 | 0.60 | 0.04 | 0.01 | 0.05 | 0.02 |
| ***111204*** | 0.00 | 0.00 | 0.04 | 0.28 | 0.21 | 0.00 | 0.19 | 0.25 | 0.01 | 0.20 | 0.03 | 0.00 | 0.11 | 0.06 |
| ***111205*** | 0.58 | 0.03 | 0.02 | 0.28 | 0.58 | 0.09 | 0.37 | 0.02 | 0.22 | 0.35 | 0.00 | 0.02 | 0.01 | 0.11 |
| ***113401*** | 0.22 | 0.39 | 0.91 | 0.43 | 0.47 | 0.91 | 0.75 | 0.45 | 0.53 | 0.82 | 0.64 | 0.17 | 0.55 | 0.28 |
| ***113402*** | 0.05 | 0.02 | 0.42 | 0.92 | 0.03 | 0.45 | 0.62 | 0.27 | 0.19 | 0.15 | 0.06 | 0.31 | 0.24 | 0.57 |
| ***113403*** | 0.14 | 0.19 | 0.02 | 0.39 | 0.68 | 0.96 | 0.03 | 0.95 | 0.14 | 0.47 | 0.54 | 0.40 | 0.74 | 0.49 |
| ***113404*** | 0.24 | 0.94 | 0.87 | 0.10 | 0.14 | 0.52 | 0.58 | 0.16 | 0.21 | 0.53 | 0.31 | 0.36 | 0.24 | 0.26 |
| ***113405*** | 0.01 | 0.17 | 0.20 | 0.10 | 0.30 | 0.07 | 0.44 | 0.17 | 0.97 | 0.04 | 0.18 | 0.03 | 0.12 | 0.05 |
| ***120101*** | 0.96 | 0.62 | 0.36 | 0.21 | 0.44 | 0.01 | 0.16 | 0.43 | 0.22 | 0.32 | 0.87 | 0.12 | 0.38 | 0.27 |
| ***120102*** | 0.03 | 0.07 | 0.38 | 0.00 | 0.26 | 0.00 | 0.19 | 0.04 | 0.08 | 0.40 | 0.24 | 0.80 | 0.14 | 0.10 |
| ***120103*** | 0.22 | 0.38 | 0.84 | 0.78 | 0.03 | 0.42 | 0.60 | 0.46 | 0.49 | 0.60 | 0.38 | 0.31 | 0.91 | 0.36 |
| ***120104*** | 0.10 | 0.00 | 0.00 | 0.27 | 0.13 | 0.23 | 0.51 | 0.41 | 0.04 | 0.40 | 0.19 | 0.00 | 0.23 | 0.57 |
| ***120105*** | 0.51 | 0.16 | 0.12 | 0.42 | 0.71 | 0.00 | 0.53 | 0.05 | 0.82 | 0.65 | 0.15 | 0.22 | 0.14 | 0.22 |

| *ID* | ***3223*** | ***1112*** | ***2113*** | ***2122*** | ***2123*** | ***2212*** | ***2213*** | ***2222*** | ***2223*** | ***2112*** | ***1121*** | ***1211*** | ***1221*** | ***2111*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***121201*** | 0.61 | 0.54 | 0.11 | 0.03 | 0.24 | 0.01 | 0.32 | 0.47 | 0.06 | 0.03 | 0.16 | 0.01 | 0.38 | 0.02 |
| ***121202*** | 0.10 | 0.06 | 0.22 | 0.00 | 0.04 | 0.00 | 0.00 | 0.11 | 0.05 | 0.17 | 0.24 | 0.33 | 0.14 | 0.04 |
| ***121203*** | 0.70 | 0.80 | 0.17 | 0.27 | 0.10 | 0.10 | 0.76 | 0.45 | 0.10 | 0.16 | 0.15 | 0.10 | 0.21 | 0.01 |
| ***121204*** | 0.02 | 0.00 | 0.00 | 0.01 | 0.11 | 0.00 | 0.10 | 0.00 | 0.00 | 0.42 | 0.00 | 0.00 | 0.26 | 0.20 |
| ***121205*** | 0.66 | 0.37 | 0.01 | 0.12 | 0.42 | 0.00 | 0.13 | 0.00 | 0.39 | 0.02 | 0.01 | 0.02 | 0.39 | 0.24 |
| ***123401*** | 0.42 | 0.53 | 0.55 | 0.03 | 0.15 | 0.71 | 0.60 | 0.25 | 0.51 | 0.11 | 0.52 | 0.02 | 0.71 | 0.77 |
| ***123402*** | 0.00 | 0.00 | 0.11 | 0.00 | 0.10 | 0.00 | 0.19 | 0.00 | 0.00 | 0.32 | 0.02 | 0.00 | 0.00 | 0.19 |
| ***123403*** | 0.78 | 0.01 | 0.53 | 0.00 | 0.45 | 0.64 | 0.92 | 0.42 | 0.13 | 0.74 | 0.03 | 0.23 | 0.13 | 0.36 |
| ***123404*** | 0.03 | 0.30 | 0.36 | 0.14 | 0.31 | 0.06 | 0.65 | 0.59 | 0.13 | 0.19 | 0.15 | 0.21 | 0.23 | 0.26 |
| ***123405*** | 0.00 | 0.33 | 0.01 | 0.02 | 0.36 | 0.16 | 0.19 | 0.04 | 0.02 | 0.23 | 0.33 | 0.00 | 0.19 | 0.12 |
| ***130101*** | 0.02 | 0.93 | 0.07 | 0.16 | 0.53 | 0.32 | 0.05 | 0.64 | 0.11 | 0.52 | 0.64 | 0.66 | 0.93 | 0.16 |
| ***130102*** | 0.20 | 0.37 | 0.14 | 0.66 | 0.76 | 0.30 | 0.12 | 0.55 | 0.36 | 0.17 | 0.08 | 0.17 | 0.89 | 0.18 |
| ***130103*** | 0.22 | 0.32 | 0.07 | 0.26 | 0.20 | 0.06 | 0.09 | 0.35 | 0.02 | 0.10 | 0.56 | 0.49 | 0.53 | 0.60 |
| ***130104*** | 0.59 | 0.86 | 0.80 | 0.12 | 0.17 | 0.82 | 0.10 | 0.14 | 0.07 | 0.33 | 0.69 | 0.01 | 0.50 | 0.09 |
| ***130105*** | 0.08 | 0.43 | 0.75 | 0.36 | 0.78 | 0.54 | 0.04 | 0.42 | 0.47 | 0.74 | 0.41 | 0.58 | 0.03 | 0.13 |
| ***131201*** | 0.23 | 0.36 | 0.26 | 0.16 | 0.48 | 0.09 | 0.13 | 0.43 | 0.09 | 0.34 | 0.45 | 0.89 | 0.14 | 0.78 |
| ***131202*** | 0.45 | 0.15 | 0.35 | 0.96 | 0.38 | 0.00 | 0.06 | 0.01 | 0.23 | 0.34 | 0.18 | 0.05 | 0.29 | 0.19 |
| ***131203*** | 0.23 | 0.43 | 0.35 | 0.74 | 0.04 | 0.12 | 0.27 | 0.41 | 0.01 | 0.09 | 0.40 | 0.30 | 0.05 | 0.58 |
| ***131204*** | 0.30 | 0.81 | 0.05 | 0.06 | 0.00 | 0.05 | 0.00 | 0.60 | 0.00 | 0.07 | 0.02 | 0.15 | 0.33 | 0.14 |

| ID | 322 3 | 111 2 | 211 3 | 212 2 | 212 3 | 221 2 | 221 3 | 222 2 | 222 3 | 211 2 | 112 1 | 121 1 | 122 1 | 211 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 131205 | 0.24 | 0.50 | 0.49 | 0.74 | 0.74 | 0.69 | 0.00 | 0.39 | 0.18 | 0.04 | 0.58 | 0.12 | 0.36 | 0.06 |
| 143501 | 0.16 | 0.57 | 0.42 | 0.48 | 0.20 | 0.30 | 0.40 | 0.71 | 0.59 | 0.86 | 0.12 | 0.56 | 0.61 | 0.03 |
| 153501 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| 163601 | 0.39 | 0.36 | 0.21 | 0.47 | 0.71 | 0.05 | 0.48 | 0.40 | 0.40 | 0.28 | 0.57 | 0.58 | 0.66 | 0.80 |
| 163602 | 0.36 | 0.43 | 0.11 | 0.22 | 0.67 | 0.09 | 0.25 | 0.11 | 0.52 | 0.37 | 0.24 | 0.50 | 0.60 | 0.37 |
| 163603 | 0.06 | 0.57 | 0.35 | 0.67 | 0.27 | 0.04 | 0.53 | 0.62 | 0.33 | 0.21 | 0.08 | 0.92 | 0.51 | 0.58 |
| 163604 | 0.39 | 0.91 | 0.20 | 0.31 | 0.12 | 0.54 | 0.55 | 0.34 | 0.47 | 0.31 | 0.59 | 0.58 | 0.56 | 0.08 |
| 163605 | 0.63 | 0.78 | 0.84 | 0.03 | 0.15 | 0.64 | 0.56 | 0.02 | 0.23 | 0.73 | 0.10 | 0.55 | 0.19 | 0.22 |
| 163701 | 0.99 | 0.01 | 0.07 | 0.29 | 0.19 | 0.00 | 0.00 | 0.39 | 0.27 | 0.00 | 0.85 | 0.00 | 0.54 | 0.00 |
| 163702 | 0.34 | 0.01 | 0.04 | 0.36 | 0.65 | 0.00 | 0.00 | 0.01 | 0.11 | 0.01 | 0.02 | 0.00 | 0.80 | 0.28 |
| 163703 | 0.24 | 0.00 | 0.09 | 0.18 | 0.61 | 0.00 | 0.00 | 0.06 | 0.01 | 0.00 | 0.52 | 0.00 | 0.71 | 0.00 |
| 163704 | 0.55 | 0.63 | 0.00 | 0.22 | 0.61 | 0.09 | 0.27 | 0.07 | 0.05 | 0.32 | 0.97 | 0.51 | 0.87 | 0.03 |
| 163705 | 0.60 | 0.28 | 0.64 | 0.49 | 0.37 | 0.22 | 0.45 | 0.02 | 0.26 | 0.10 | 0.65 | 0.82 | 0.02 | 0.41 |
| 163801 | 0.47 | 0.03 | 0.38 | 0.02 | 0.65 | 0.05 | 0.04 | 0.20 | 0.36 | 0.09 | 0.01 | 0.02 | 0.40 | 0.00 |
| 163802 | 0.70 | 0.00 | n/d | 0.57 | 0.16 | 0.00 | 0.00 | 0.00 | 0.81 | n/d | 0.07 | 0.00 | 0.00 | 0.00 |
| 163803 | 0.32 | 0.11 | 0.22 | 0.26 | 0.20 | 0.06 | 0.10 | 0.97 | 0.49 | 0.25 | 0.04 | 0.02 | 0.38 | 0.00 |
| 163804 | 0.02 | 0.09 | 0.33 | 0.01 | 0.24 | 0.07 | 0.02 | 0.00 | 0.11 | 0.03 | 0.33 | 0.14 | 0.00 | 0.12 |
| 163805 | 0.36 | 0.00 | 0.00 | 0.33 | 0.20 | 0.00 | 0.00 | 0.07 | 0.48 | 0.00 | 0.18 | 0.00 | 0.00 | 0.00 |
| 163901 | 0.01 | 0.09 | 0.21 | 0.33 | 0.00 | 0.02 | 0.25 | 0.86 | 0.00 | 0.10 | 0.00 | 0.00 | 0.43 | 0.00 |

| ID | 322 3 | 111 2 | 211 3 | 212 2 | 212 3 | 221 2 | 221 3 | 222 2 | 222 3 | 211 2 | 112 1 | 121 1 | 122 1 | 211 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***163902*** | 0.28 | 0.00 | n/d | 0.50 | 0.79 | 0.00 | 0.00 | 0.01 | 0.02 | n/d | 0.01 | 0.00 | 0.00 | 0.00 |
| ***163903*** | 0.15 | 0.11 | 0.14 | 0.15 | 0.00 | 0.03 | 0.25 | 0.97 | 0.01 | 0.10 | 0.00 | 0.00 | 0.30 | 0.00 |
| ***163904*** | n/d | 0.01 | 0.05 | 0.00 | 0.00 | 0.03 | 0.01 | 0.00 | 0.02 | 0.00 | 0.13 | 0.03 | 0.00 | 0.22 |
| ***163905*** | 0.01 | 0.00 | 0.00 | 0.09 | 0.52 | 0.00 | 0.00 | 0.03 | 0.31 | 0.00 | 0.34 | 0.00 | 0.17 | 0.00 |
| ***171601*** | 0.80 | 0.54 | 0.52 | 0.01 | 0.22 | 0.99 | 0.25 | 0.15 | 0.31 | 0.93 | 0.17 | 0.67 | 0.60 | 0.22 |
| ***171602*** | 0.00 | 0.04 | 0.04 | 0.11 | 0.09 | 0.00 | 0.17 | 0.61 | 0.10 | 0.08 | 0.39 | 0.82 | 0.19 | 0.79 |
| ***171603*** | 0.91 | 0.81 | 0.84 | 0.86 | 0.00 | 0.17 | 0.53 | 0.00 | 0.06 | 0.46 | 0.04 | 0.51 | 0.46 | 0.82 |
| ***171604*** | 0.05 | n/d | 0.04 | 0.00 | 0.00 | 0.03 | 0.00 | 0.06 | 0.00 | 0.62 | 0.02 | 0.04 | 0.12 | 0.12 |
| ***171605*** | 0.41 | 0.86 | 0.34 | 0.05 | 0.03 | 0.04 | 0.00 | 0.17 | 0.01 | 0.33 | 0.00 | 0.16 | 0.00 | 0.23 |
| ***171701*** | 0.00 | n/d | 0.77 | 0.00 | 0.30 | 0.00 | 0.34 | 0.01 | 0.07 | 0.61 | 0.00 | 0.89 | 0.04 | 0.44 |
| ***171702*** | 0.00 | 0.04 | 0.00 | 0.07 | 0.00 | n/d | 0.38 | 0.52 | 0.01 | 0.02 | 0.07 | 0.65 | 0.03 | 0.80 |
| ***171703*** | 0.32 | 0.82 | 0.91 | 0.02 | 0.07 | 0.29 | 0.15 | 0.04 | 0.03 | 0.06 | 0.00 | 0.35 | 0.05 | 0.27 |
| ***171704*** | 0.01 | n/d | 0.00 | n/d | 0.00 | 0.01 | 0.00 | 0.31 | 0.00 | 0.37 | 0.01 | 0.00 | 0.00 | 0.12 |
| ***171705*** | 0.26 | 0.02 | 0.22 | 0.03 | 0.06 | 0.00 | 0.11 | 0.00 | 0.00 | 0.61 | 0.00 | 0.03 | n/d | 0.00 |
| ***174001*** | 0.67 | 0.00 | 0.78 | 0.07 | 0.15 | 0.01 | 0.08 | 0.00 | 0.05 | 0.03 | 0.23 | 0.04 | 0.00 | 0.08 |
| ***174002*** | 0.00 | 0.02 | 0.01 | 0.00 | 0.22 | n/d | 0.03 | 0.19 | 0.28 | 0.01 | 0.00 | 0.08 | 0.29 | 0.00 |
| ***174003*** | 0.39 | 0.69 | 0.05 | 0.00 | 0.00 | 0.00 | 0.04 | 0.04 | 0.53 | 0.12 | 0.00 | 0.54 | 0.06 | 0.04 |
| ***174004*** | 0.04 | n/d | 0.12 | 0.00 | 0.01 | 0.01 | 0.00 | 0.10 | 0.01 | 0.21 | 0.00 | 0.01 | 0.10 | 0.05 |
| ***174005*** | 0.63 | 0.46 | 0.01 | 0.09 | 0.01 | 0.01 | 0.00 | 0.07 | 0.02 | 0.22 | 0.03 | 0.01 | 0.00 | 0.23 |

| ID | 322 3 | 111 2 | 211 3 | 212 2 | 212 3 | 221 2 | 221 3 | 222 2 | 222 3 | 211 2 | 112 1 | 121 1 | 122 1 | 211 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17410 1 | 0.06 | 0.29 | 0.38 | 0.51 | 0.55 | 0.34 | 0.94 | 0.55 | 0.65 | 0.64 | 0.54 | 0.58 | 0.04 | 0.45 |
| 17410 2 | 0.01 | 0.27 | 0.51 | 0.15 | 0.24 | 0.37 | 0.14 | 0.36 | 0.59 | 0.41 | 0.57 | 0.22 | 0.25 | 0.59 |
| 17410 3 | 0.02 | 0.03 | 0.75 | 0.93 | 0.42 | 0.34 | 0.48 | 0.62 | 0.85 | 0.66 | 0.04 | 0.06 | 0.22 | 0.88 |
| 17410 4 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 17410 5 | 0.01 | 0.00 | 0.19 | 0.00 | 0.03 | 0.23 | 0.06 | 0.00 | 0.01 | 0.70 | 0.00 | 0.37 | n/d | 0.00 |
| 17420 1 | 0.02 | n/d | 0.45 | 0.00 | 0.70 | 0.01 | 0.28 | 0.02 | 0.03 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| 17420 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.43 | n/d | 0.00 | 0.06 | 0.03 | 0.01 | n/d | 0.18 | 0.12 | 0.00 |
| 17420 3 | 0.56 | 0.25 | 0.79 | 0.00 | 0.32 | 0.01 | 0.01 | 0.00 | 0.00 | 0.07 | 0.00 | 0.01 | 0.00 | 0.00 |
| 17420 4 | 0.01 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 | 0.14 | 0.01 | 0.02 | 0.00 | 0.08 |
| 17420 5 | 0.42 | 0.05 | 0.02 | 0.01 | 0.01 | 0.00 | 0.02 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.49 |
| 17430 1 | 0.09 | 0.08 | 0.44 | 0.11 | 0.53 | 0.07 | 0.47 | 0.18 | 0.88 | 0.68 | 0.04 | 0.60 | 0.02 | 0.52 |
| 17430 2 | 0.03 | 0.62 | 0.40 | 0.04 | 0.12 | 0.25 | 0.13 | 0.06 | 0.44 | 0.39 | 0.35 | 0.22 | 0.08 | 0.29 |
| 17430 3 | 0.03 | 0.47 | 0.27 | 0.16 | 0.38 | 0.68 | 0.83 | 0.17 | 0.89 | 0.58 | 0.02 | 0.90 | 0.11 | 0.53 |
| 17430 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 |
| 17430 5 | 0.00 | 0.04 | 0.22 | 0.00 | 0.00 | 0.05 | 0.04 | 0.00 | 0.00 | 0.29 | 0.00 | 0.00 | n/d | 0.00 |
| 18440 1 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.01 | 0.02 | 0.00 | 0.01 | n/d | 0.00 | 0.05 |
| 18440 2 | n/d | n/d | n/d | n/d | n/d | 0.00 | n/d | 0.00 | n/d | 0.01 | n/d | 0.00 | n/d | n/d |
| 18440 3 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.09 | 0.01 | 0.00 | 0.00 | n/d | 0.00 | 0.03 |
| 18440 4 | 0.18 | 0.00 | n/d | n/d | 0.00 | n/d | 0.02 | n/d | n/d | 0.00 | 0.02 | n/d | n/d | 0.00 |

| ID | 3223 | 1112 | 2113 | 2122 | 2123 | 2212 | 2213 | 2222 | 2223 | 2112 | 1121 | 1211 | 1221 | 2111 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***184405*** | 0.00 | n/d | n/d | n/d | 0.09 | n/d | n/d | n/d | 0.00 | 0.03 | n/d | 0.00 | n/d | n/d |
| ***190101*** | 0.98 | 0.51 | 0.35 | 0.51 | 0.54 | 0.75 | 0.36 | 0.50 | 0.67 | 0.00 | 0.47 | 0.78 | 0.21 | 0.05 |
| ***190102*** | 0.00 | n/d | n/d | 0.01 | 0.70 | n/d | n/d | 0.57 | 0.40 | n/d | 0.34 | n/d | 0.05 | n/d |
| ***190103*** | 0.86 | 0.37 | 0.22 | 0.64 | 0.63 | 0.09 | 0.36 | 0.62 | 0.67 | 0.02 | 0.18 | 0.66 | 0.17 | 0.23 |
| ***190104*** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| ***190105*** | 0.00 | n/d | n/d | 0.12 | 0.12 | n/d | n/d | 0.48 | 0.88 | n/d | 0.13 | n/d | 0.02 | n/d |
| ***191201*** | 0.49 | 0.37 | 0.52 | 0.90 | 0.99 | 0.67 | 0.11 | 0.22 | 0.25 | 0.60 | 0.54 | 0.38 | 0.64 | 0.74 |
| ***191202*** | n/d | n/d | n/d | 0.00 | 0.12 | n/d | n/d | 0.08 | 0.01 | n/d | 0.09 | n/d | 0.44 | n/d |
| ***191203*** | 0.06 | 0.50 | 0.56 | 0.90 | 0.24 | 0.31 | 0.04 | 0.27 | 0.17 | 0.73 | 0.28 | 0.38 | 0.38 | 0.61 |
| ***191204*** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| ***191205*** | n/d | n/d | n/d | 0.02 | 0.00 | n/d | n/d | 0.01 | 0.01 | n/d | 0.00 | n/d | n/d | n/d |
| ***193402*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***193403*** | 0.61 | 0.24 | 0.04 | 0.67 | 0.44 | 0.18 | 0.00 | 0.58 | 0.01 | 0.01 | 0.09 | 0.03 | 0.15 | 0.61 |
| ***193404*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***193405*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***194501*** | 0.56 | 0.03 | 0.00 | 0.19 | 0.43 | 0.59 | 0.67 | 0.37 | 0.10 | 0.02 | 0.96 | 0.18 | 0.19 | 0.19 |
| ***194601*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***194701*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | n/d | 0.00 |
| ***194801*** | 0.56 | 0.03 | 0.00 | 0.19 | 0.29 | 0.60 | 0.68 | 0.37 | 0.11 | 0.02 | 0.96 | 0.18 | 0.19 | 0.19 |

| ID | 322 3 | 111 2 | 211 3 | 212 2 | 212 3 | 221 2 | 221 3 | 222 2 | 222 3 | 211 2 | 112 1 | 121 1 | 122 1 | 211 1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **194802** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **194803** | 0.61 | 0.01 | 0.01 | 0.16 | 0.61 | 0.17 | 0.00 | 0.58 | 0.01 | 0.30 | 0.16 | 0.00 | 0.15 | 0.61 |
| **194804** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **194805** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **194901** | 0.16 | 0.18 | 0.39 | 0.36 | 0.50 | 0.01 | 0.22 | 0.22 | 0.28 | 0.47 | 0.74 | 0.05 | 0.27 | 0.74 |
| **194902** | 0.00 | 0.00 | 0.00 | 0.69 | 0.05 | 0.00 | n/d | 0.39 | 0.21 | n/d | 0.63 | 0.00 | 0.90 | 0.00 |
| **194903** | 0.48 | 0.19 | 0.41 | 0.11 | 0.34 | 0.19 | 0.73 | 0.74 | 0.17 | 0.91 | 0.57 | 0.01 | 0.46 | 0.20 |
| **194904** | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | 0.02 | 0.00 |
| **194905** | 0.06 | 0.02 | 0.00 | 0.12 | 0.75 | 0.00 | 0.00 | 0.11 | 0.18 | 0.00 | 0.40 | 0.02 | 0.31 | 0.00 |
| **205001** | 0.12 | 0.77 | 0.08 | 0.90 | 0.03 | 0.25 | 0.11 | 0.10 | 0.43 | 0.35 | 0.56 | 0.01 | 0.51 | 0.07 |
| **205002** | 0.08 | n/d | n/d | 0.16 | 0.63 | n/d | n/d | 0.01 | 0.71 | n/d | 0.58 | n/d | 0.27 | n/d |
| **205003** | 0.00 | 0.57 | 0.15 | 0.85 | 0.13 | 0.18 | 0.11 | 0.24 | 0.07 | 0.82 | 0.73 | 0.00 | 0.22 | 0.85 |
| **205004** | 0.37 | 0.70 | 0.68 | 0.45 | 0.60 | 0.02 | 0.16 | n/d | 0.49 | 0.15 | 0.52 | 0.04 | n/d | 0.32 |
| **205005** | 0.08 | n/d | 0.62 | 0.79 | 0.10 | n/d | n/d | 0.62 | 0.22 | n/d | 0.25 | n/d | 0.01 | n/d |
| **205101** | 0.01 | 0.87 | 0.20 | 0.82 | 0.80 | 0.42 | 0.12 | 0.64 | 0.21 | 0.50 | 0.55 | 0.02 | 0.13 | 0.13 |
| **205102** | 0.22 | n/d | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.23 | n/d | 0.01 | n/d | n/d | n/d |
| **205103** | 0.14 | 0.30 | 0.23 | 0.54 | 0.81 | 0.10 | 0.41 | 0.26 | 0.79 | 0.18 | 0.16 | 0.02 | 0.63 | 0.14 |
| **205104** | 0.02 | 0.08 | 0.13 | 0.07 | 0.39 | 0.06 | 0.04 | n/d | 0.47 | 0.15 | 0.27 | 0.03 | n/d | 0.01 |
| **205105** | 0.02 | n/d | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.03 | n/d | 0.01 | n/d | 0.00 | n/d |

| ID | 3223 | 1112 | 2113 | 2122 | 2123 | 2212 | 2213 | 2222 | 2223 | 2112 | 1121 | 1211 | 1221 | 2111 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 205201 | 0.63 | 0.60 | 0.08 | 0.22 | 0.55 | 0.02 | 0.95 | 0.04 | 0.60 | 0.37 | 0.99 | 0.02 | 0.89 | 0.57 |
| 205202 | 0.10 | n/d | n/d | 0.20 | 0.26 | n/d | n/d | 0.69 | 0.18 | n/d | 0.58 | n/d | 0.40 | n/d |
| 205203 | 0.22 | 0.49 | 0.43 | 0.98 | 0.10 | 0.28 | 0.69 | 0.37 | 0.17 | 0.23 | 0.01 | 0.13 | 0.29 | 0.61 |
| 205204 | 0.80 | 0.59 | 0.50 | 0.32 | 0.04 | 0.10 | 0.08 | n/d | 0.34 | 0.70 | 0.30 | 0.18 | n/d | 0.84 |
| 205205 | 0.11 | n/d | 0.51 | 0.16 | 0.32 | n/d | 0.39 | 0.89 | 0.03 | n/d | 0.56 | n/d | 0.04 | n/d |
| 205301 | 0.13 | 0.14 | 0.23 | 0.45 | 0.04 | 0.01 | 0.04 | 0.72 | 0.12 | 0.87 | 0.05 | 0.00 | 0.70 | 0.61 |
| 205302 | 0.31 | n/d | n/d | 0.38 | 0.53 | n/d | n/d | n/d | 0.20 | n/d | 0.02 | n/d | n/d | n/d |
| 205303 | 0.12 | 0.74 | 0.71 | 0.38 | 0.04 | 0.35 | 0.41 | 0.82 | 0.01 | 0.14 | 0.63 | 0.57 | 0.03 | 0.12 |
| 205304 | 0.23 | 0.00 | 0.65 | 0.32 | 0.03 | 0.85 | 0.10 | n/d | 0.11 | 0.24 | 0.07 | n/d | n/d | 0.01 |
| 205305 | 0.31 | n/d | n/d | 0.18 | 0.32 | n/d | n/d | 0.04 | 0.25 | n/d | 0.65 | n/d | 0.07 | n/d |
| 205401 | 0.35 | 0.09 | 0.52 | 0.11 | 0.07 | 0.28 | 0.33 | 0.43 | 0.01 | 0.16 | 0.01 | 0.01 | 0.55 | 0.03 |
| 205402 | 0.00 | n/d | n/d | 0.08 | 0.36 | n/d | n/d | 0.00 | 0.00 | n/d | 0.00 | n/d | n/d | n/d |
| 205403 | 0.04 | 0.25 | 0.23 | 0.44 | 0.48 | 0.02 | 0.29 | 0.14 | 0.15 | 0.25 | 0.41 | 0.00 | 0.00 | 0.03 |
| 205404 | 0.28 | 0.01 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | n/d | n/d |
| 205405 | 0.00 | n/d | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d |
| 205501 | 0.12 | 0.85 | 0.78 | 0.68 | 0.01 | 0.50 | 0.81 | 0.85 | 0.40 | 0.04 | 0.08 | 0.58 | 0.06 | 0.03 |
| 205502 | 0.09 | n/d | n/d | 0.13 | 0.60 | n/d | n/d | 0.02 | 0.64 | n/d | 0.14 | n/d | n/d | n/d |
| 205503 | 0.73 | 0.46 | 0.66 | 0.21 | 0.28 | 0.17 | 0.25 | 0.68 | 0.46 | 0.10 | 0.27 | 0.59 | 0.50 | 0.02 |
| 205504 | 0.01 | 0.01 | 0.48 | 0.72 | 0.30 | 0.41 | 0.88 | n/d | 0.19 | n/d | 0.02 | 0.01 | n/d | n/d |

| *ID* | ***3223*** | ***1112*** | ***2113*** | ***2122*** | ***2123*** | ***2212*** | ***2213*** | ***2222*** | ***2223*** | ***2112*** | ***1121*** | ***1211*** | ***1221*** | ***2111*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***205505*** | 0.09 | n/d | n/d | 0.51 | 0.57 | n/d | n/d | 0.32 | 0.03 | n/d | 0.25 | n/d | 0.04 | n/d |
| ***205601*** | 0.03 | 0.25 | 0.02 | 0.54 | 0.33 | 0.18 | 0.66 | 0.63 | 0.48 | 0.56 | 0.35 | 0.82 | 0.72 | 0.36 |
| ***205602*** | 0.20 | 0.00 | 0.00 | 0.26 | 0.90 | 0.00 | 0.00 | 0.21 | 0.01 | 0.00 | 0.15 | 0.00 | 0.00 | 0.00 |
| ***205603*** | 0.06 | 0.35 | 0.40 | 0.54 | 0.00 | 0.80 | 0.08 | 0.36 | 0.02 | 0.21 | 0.93 | 0.52 | 0.37 | 0.23 |
| ***205604*** | 0.30 | 0.41 | 0.02 | 0.12 | 0.78 | 0.38 | 0.34 | 0.00 | 0.41 | 0.04 | 0.07 | 0.00 | 0.00 | 0.00 |
| ***205605*** | 0.13 | 0.00 | 0.00 | 0.67 | 0.25 | 0.00 | 0.00 | 0.06 | 0.85 | 0.00 | 0.88 | 0.00 | 0.55 | 0.00 |
| ***205701*** | 0.60 | 0.02 | 0.39 | 0.02 | 0.26 | 0.42 | 0.79 | 0.17 | 0.65 | 0.33 | 0.79 | 0.52 | 0.61 | 0.06 |
| ***205702*** | 0.09 | 0.00 | 0.11 | 0.39 | 0.15 | 0.05 | 0.12 | 0.07 | 0.55 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 |
| ***205703*** | 0.24 | 0.01 | 0.60 | 0.26 | 0.63 | 0.58 | 0.22 | 0.89 | 0.21 | 0.86 | 0.17 | 0.45 | 0.22 | 0.12 |
| ***205704*** | 0.28 | 0.02 | 0.25 | 0.09 | 0.01 | 0.05 | 0.67 | 0.00 | 0.03 | 0.09 | 0.06 | 0.24 | 0.00 | 0.01 |
| ***205705*** | 0.17 | 0.00 | 0.00 | 0.03 | 0.54 | 0.00 | 0.00 | 0.03 | 0.79 | 0.00 | 0.19 | 0.00 | 0.00 | 0.00 |
| ***205801*** | 0.75 | 0.44 | 0.30 | 0.31 | 0.44 | 0.00 | 0.10 | 0.35 | 0.21 | 0.93 | 0.67 | 0.22 | 0.20 | 0.05 |
| ***205802*** | 0.50 | 0.00 | 0.00 | 0.14 | 0.23 | 0.00 | 0.00 | 0.03 | 0.20 | 0.00 | 0.20 | 0.00 | 0.01 | 0.00 |
| ***205803*** | 0.19 | 0.57 | 0.06 | 0.70 | 0.65 | 0.44 | 0.48 | 0.01 | 0.79 | 0.26 | 0.94 | 0.01 | 0.22 | 0.18 |
| ***205804*** | 0.52 | 0.61 | 0.29 | 0.06 | 0.79 | 0.00 | 0.04 | 0.00 | 0.49 | 0.07 | 0.03 | 0.05 | 0.00 | 0.00 |
| ***205805*** | 0.14 | 0.00 | 0.00 | 0.52 | 0.93 | 0.00 | 0.00 | 0.01 | 0.44 | 0.00 | 0.58 | 0.00 | 0.10 | 0.00 |
| ***210101*** | 0.64 | 0.29 | 0.28 | 0.27 | 0.28 | 0.18 | 0.53 | 0.82 | 0.18 | 0.80 | 0.01 | 0.31 | 0.62 | 0.13 |
| ***210102*** | 0.56 | 0.10 | 0.12 | 0.44 | 0.00 | 0.30 | 0.15 | 0.09 | 0.40 | 0.08 | 0.27 | 0.57 | 0.11 | 0.31 |
| ***210103*** | 0.49 | 0.24 | 0.58 | 0.11 | 0.18 | 0.09 | 0.81 | 0.27 | 0.15 | 0.86 | 0.05 | 0.15 | 0.85 | 0.28 |

| ID | 3223 | 1112 | 2113 | 2122 | 2123 | 2212 | 2213 | 2222 | 2223 | 2112 | 1121 | 1211 | 1221 | 2111 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 210104 | 0.14 | 0.23 | 0.57 | 0.77 | 0.37 | 0.04 | 0.22 | 0.38 | 0.17 | 0.51 | 0.89 | 0.93 | 0.02 | 0.69 |
| 210105 | 0.00 | 0.00 | 0.35 | 0.23 | 0.77 | 0.89 | 0.74 | 0.64 | 0.02 | 0.83 | 0.43 | 0.67 | 0.80 | 0.26 |
| 211201 | 0.02 | 0.63 | 0.37 | 0.82 | 0.00 | 0.40 | 0.67 | 0.71 | 0.17 | 0.69 | 0.15 | 0.59 | 0.47 | 0.16 |
| 211202 | 0.02 | 0.16 | 0.20 | 0.46 | 0.59 | 0.42 | 0.03 | 0.15 | 0.69 | 0.07 | 0.17 | 0.52 | 0.98 | 0.22 |
| 211203 | 0.03 | 0.60 | 0.39 | 0.10 | 0.01 | 0.08 | 0.11 | 0.66 | 0.24 | 0.79 | 0.35 | 0.31 | 0.36 | 0.52 |
| 211204 | 0.14 | 0.06 | 0.07 | 0.95 | 0.21 | 0.81 | 0.56 | 0.20 | 0.08 | 0.35 | 0.04 | 0.05 | 0.41 | 0.08 |
| 211205 | 0.12 | 0.28 | 0.11 | 0.02 | 0.06 | 0.18 | 0.07 | 0.01 | 0.23 | 0.45 | 0.23 | 0.37 | 0.15 | 0.08 |
| 214901 | 0.15 | 0.50 | 0.25 | 0.01 | 0.55 | 0.03 | 0.90 | 0.48 | 0.80 | 0.38 | 0.31 | 0.16 | 0.18 | 0.62 |
| 214902 | 0.07 | 0.87 | 0.06 | 0.38 | 0.31 | 0.00 | 0.01 | 0.63 | 0.17 | 0.02 | 0.36 | 1.00 | 0.01 | 0.43 |
| 214903 | 0.55 | 0.86 | 0.43 | 0.06 | 0.76 | 0.11 | 0.61 | 0.16 | 0.37 | 0.28 | 0.91 | 0.44 | 0.22 | 0.15 |
| 214904 | 0.34 | 0.57 | 0.40 | 0.52 | 0.05 | 0.03 | 0.97 | 0.53 | 0.73 | 0.10 | 0.60 | 0.87 | 0.66 | 0.47 |
| 214905 | 0.04 | 0.75 | 0.47 | 0.93 | 0.48 | 0.45 | 0.07 | 0.41 | 0.29 | 0.41 | 0.84 | 0.02 | 0.55 | 0.81 |

| ID | 2121 | 2211 | 2221 | 3111 | 3121 | 3211 | 3221 | 1111 | 1131 | 1132 | 1133 | 1231 | 1232 | 1233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 010101 | 0.28 | 0.30 | 0.13 | 0.33 | 0.37 | 0.14 | 0.05 | 0.03 | 0.45 | 0.35 | 0.75 | 0.51 | 0.14 | 0.11 |
| 010102 | 0.83 | 0.82 | 0.03 | 0.50 | 0.75 | 0.82 | 0.78 | 0.35 | 0.81 | 0.97 | 0.50 | 0.89 | 0.49 | 0.52 |
| 010103 | 0.76 | 0.06 | 0.14 | 0.58 | 0.46 | 0.90 | 0.43 | 0.19 | 0.27 | 0.05 | 0.59 | 0.10 | 0.17 | 0.78 |
| 010104 | 0.65 | 0.49 | 0.29 | 0.04 | 0.19 | 0.61 | 0.34 | 0.63 | 0.66 | 0.57 | 0.42 | 0.95 | 0.46 | 0.49 |
| 010105 | 0.81 | 0.15 | 0.46 | 0.44 | 0.89 | 0.48 | 0.67 | 0.73 | 0.98 | 0.13 | 0.94 | 0.58 | 0.58 | 0.00 |

| *ID* | ***2121*** | ***2211*** | ***2221*** | ***3111*** | ***3121*** | ***3211*** | ***3221*** | ***1111*** | ***1131*** | ***1132*** | ***1133*** | ***1231*** | ***1232*** | ***1233*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***010201*** | 0.19 | 0.07 | 0.13 | 0.81 | 0.16 | 0.62 | 0.77 | 0.76 | 0.29 | 0.28 | 0.56 | 0.35 | 0.04 | 0.06 |
| ***010202*** | 0.12 | 0.36 | 0.17 | 0.87 | 0.18 | 0.10 | 0.05 | 0.08 | 0.08 | 0.05 | 0.54 | 0.10 | 0.26 | 0.17 |
| ***010203*** | 0.01 | 0.04 | 0.01 | 0.55 | 0.34 | 0.61 | 0.45 | 0.66 | 0.61 | 0.32 | 0.32 | 0.50 | 0.09 | 0.55 |
| ***010204*** | 0.01 | 0.05 | 0.58 | 0.50 | 0.00 | 0.82 | 0.02 | 0.42 | 0.23 | 0.04 | 0.94 | 0.05 | 0.25 | 0.28 |
| ***010205*** | 0.39 | 0.57 | 0.65 | 0.76 | 0.27 | 0.01 | 0.21 | 0.83 | 0.02 | 0.19 | 0.37 | 0.38 | 0.56 | 0.01 |
| ***010301*** | 0.04 | 0.17 | 0.61 | 0.61 | 0.27 | 0.25 | 0.33 | 0.67 | 0.80 | 0.83 | 0.62 | 0.46 | 0.60 | 0.34 |
| ***010302*** | 0.12 | 0.83 | 0.39 | 0.57 | 0.35 | 0.28 | 0.94 | 0.43 | 0.60 | 0.56 | 0.04 | 0.27 | 0.48 | 0.16 |
| ***010303*** | 0.58 | 0.29 | 0.89 | 0.80 | 0.03 | 0.40 | 0.38 | 0.50 | 0.48 | 0.58 | 0.50 | 0.59 | 0.97 | 0.37 |
| ***010304*** | 0.29 | 0.19 | 0.09 | 0.96 | 0.28 | 0.83 | 0.59 | 0.11 | 0.37 | 0.28 | 0.52 | 0.00 | 0.10 | 0.41 |
| ***010305*** | 0.21 | 0.26 | 0.56 | 0.11 | 0.05 | 0.01 | 0.01 | 0.54 | 0.33 | 0.12 | 0.63 | 0.04 | 0.12 | 0.55 |
| ***010401*** | 0.23 | 0.68 | 0.12 | 0.71 | 0.07 | 0.27 | 0.66 | 0.55 | 0.08 | 0.44 | 0.29 | 0.92 | 0.68 | 0.87 |
| ***010402*** | 0.00 | 0.89 | 0.31 | 0.35 | 0.76 | 0.51 | 0.58 | 0.88 | 0.85 | 0.08 | 0.30 | 0.41 | 0.39 | 0.05 |
| ***010403*** | 0.23 | 0.13 | 0.70 | 0.05 | 0.05 | 0.47 | 0.14 | 0.87 | 0.10 | 0.06 | 0.55 | 0.73 | 0.23 | 0.78 |
| ***010404*** | 0.24 | 0.44 | 0.60 | 0.07 | 0.82 | 0.70 | 0.77 | 0.64 | 0.08 | 0.75 | 0.30 | 0.38 | 0.24 | 0.29 |
| ***010405*** | 0.37 | 0.67 | 0.72 | 0.11 | 0.74 | 0.83 | 0.69 | 0.49 | 0.03 | 0.23 | 0.11 | 0.24 | 0.41 | 0.00 |
| ***010501*** | 0.39 | 0.19 | 0.67 | 0.42 | 0.08 | 0.10 | 0.11 | 0.20 | 0.35 | 0.30 | 0.18 | 0.36 | 0.08 | 0.06 |
| ***010502*** | 0.17 | 0.39 | 0.77 | 0.71 | 0.49 | 0.32 | 0.34 | 0.05 | 0.60 | 0.57 | 0.41 | 0.55 | 0.08 | 0.10 |
| ***010503*** | 0.91 | 0.15 | 0.47 | 0.17 | 0.58 | 0.01 | 0.09 | 0.51 | 0.71 | 0.51 | 0.40 | 0.18 | 0.73 | 0.10 |
| ***010504*** | 0.32 | 0.32 | 0.18 | 0.70 | 0.28 | 0.04 | 0.12 | 0.46 | 0.15 | 0.80 | 0.19 | 0.35 | 0.71 | 0.52 |

| ID | 212 1 | 221 1 | 222 1 | 311 1 | 312 1 | 321 1 | 322 1 | 111 1 | 113 1 | 113 2 | 113 3 | 123 1 | 123 2 | 123 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **010505** | 0.84 | 0.44 | 0.28 | 0.52 | 0.85 | 0.22 | 0.74 | 0.22 | 0.50 | 0.25 | 0.67 | 0.29 | 0.54 | 0.01 |
| **010601** | 0.64 | 0.04 | 0.00 | 0.11 | 0.17 | 0.35 | 0.12 | 0.28 | 0.02 | 0.38 | 0.91 | 0.35 | 0.01 | 0.25 |
| **010602** | 0.16 | 0.28 | 0.20 | 0.92 | 0.73 | 0.81 | 0.67 | 0.68 | 0.73 | 0.15 | 0.51 | 0.59 | 0.23 | 0.29 |
| **010603** | 0.08 | 0.18 | 0.01 | 0.00 | 0.24 | 0.52 | 0.22 | 0.26 | 0.45 | 0.89 | 0.08 | 0.17 | 0.06 | 0.71 |
| **010604** | 0.83 | 0.21 | 0.69 | 0.02 | 0.29 | 0.31 | 0.19 | 0.46 | 0.97 | 0.42 | 0.30 | 0.59 | 0.26 | 0.19 |
| **010605** | 0.28 | 0.89 | 0.86 | 0.94 | 0.76 | 0.93 | 0.29 | 0.17 | 0.34 | 0.02 | 0.11 | 0.70 | 0.81 | 0.15 |
| **010701** | 0.04 | 0.42 | 0.59 | 0.65 | 0.21 | 0.38 | 0.49 | 0.89 | 0.71 | 0.22 | 0.48 | 0.10 | 0.92 | 0.27 |
| **010702** | 0.41 | 0.02 | 0.86 | 0.01 | 0.80 | 0.12 | 0.29 | 0.46 | 0.58 | 0.31 | 0.23 | 0.48 | 0.26 | 0.11 |
| **010703** | 0.33 | 0.66 | 0.23 | 0.56 | 0.09 | 0.14 | 0.55 | 0.35 | 0.73 | 0.17 | 0.94 | 0.47 | 0.66 | 0.04 |
| **010704** | 0.09 | 0.98 | 0.32 | 0.69 | 0.63 | 0.46 | 0.05 | 0.33 | 0.10 | 0.29 | 0.17 | 0.77 | 0.96 | 0.62 |
| **010705** | 0.97 | 0.53 | 0.70 | 0.33 | 0.87 | 0.28 | 0.49 | 0.21 | 0.26 | 0.86 | 0.24 | 0.64 | 0.74 | 0.33 |
| **010801** | 0.03 | 0.77 | 0.12 | 0.20 | 0.90 | 0.22 | 0.68 | 0.48 | 0.57 | 0.11 | 0.95 | 0.21 | 0.81 | 0.82 |
| **010802** | 0.88 | 0.64 | 0.46 | 0.25 | 0.13 | 0.52 | 0.34 | 0.66 | 0.11 | 0.05 | 0.08 | 0.36 | 0.77 | 0.11 |
| **010803** | 0.68 | 0.92 | 0.18 | 0.41 | 0.02 | 0.05 | 0.49 | 0.02 | 0.27 | 0.92 | 0.28 | 0.52 | 0.24 | 0.41 |
| **010804** | 0.10 | 0.64 | 0.04 | 0.70 | 0.53 | 0.72 | 0.07 | 0.49 | 0.64 | 0.00 | 0.68 | 0.25 | 0.89 | 0.75 |
| **010805** | 0.79 | 0.56 | 0.54 | 0.64 | 0.73 | 0.14 | 0.11 | 0.93 | 0.97 | 0.67 | 0.55 | 0.31 | 0.25 | 0.78 |
| **010901** | 0.70 | 0.68 | 0.23 | 0.79 | 0.29 | 0.59 | 0.02 | 0.11 | 0.18 | 0.85 | 0.33 | 0.71 | 0.28 | 0.82 |
| **010902** | 0.77 | 0.25 | 0.33 | 0.26 | 0.93 | 0.28 | 0.46 | 0.74 | 0.26 | 0.64 | 0.26 | 0.23 | 0.54 | 0.23 |
| **010903** | 0.65 | 0.27 | 0.02 | 0.60 | 0.21 | 0.47 | 0.21 | 0.44 | 0.03 | 0.15 | 0.09 | 0.15 | 0.09 | 0.33 |

| *ID* | ***2121*** | ***2211*** | ***2221*** | ***3111*** | ***3121*** | ***3211*** | ***3221*** | ***1111*** | ***1131*** | ***1132*** | ***1133*** | ***1231*** | ***1232*** | ***1233*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***010904*** | 0.10 | 0.87 | 0.16 | 0.11 | 0.36 | 0.71 | 0.44 | 0.50 | 0.72 | 0.82 | 0.62 | 0.42 | 0.43 | 0.34 |
| ***010905*** | 0.84 | 0.07 | 0.12 | 0.42 | 0.94 | 0.39 | 0.16 | 0.22 | 0.56 | 0.87 | 0.25 | 0.09 | 0.36 | 0.00 |
| ***011001*** | 0.31 | 0.69 | 0.41 | 0.06 | 0.83 | 0.85 | 0.13 | 0.15 | 0.07 | 0.14 | 0.67 | 0.37 | 0.93 | 0.79 |
| ***011002*** | 0.84 | 0.19 | 0.47 | 0.01 | 0.24 | 0.03 | 0.43 | 0.16 | 0.36 | 0.52 | 0.02 | 0.95 | 0.09 | 0.77 |
| ***011003*** | 0.56 | 0.73 | 0.52 | 0.27 | 0.14 | 0.05 | 0.26 | 0.63 | 0.37 | 0.10 | 0.17 | 0.63 | 0.38 | 0.68 |
| ***011004*** | 0.14 | 0.52 | 0.73 | 0.40 | 0.89 | 0.04 | 0.02 | 0.13 | 0.25 | 0.29 | 0.32 | 0.05 | 0.22 | 0.60 |
| ***011005*** | 0.07 | 0.02 | 0.31 | 0.88 | 0.41 | 0.97 | 0.78 | 0.06 | 0.17 | 0.90 | 0.04 | 0.02 | 0.17 | 0.23 |
| ***011101*** | 0.86 | 0.78 | 0.22 | 0.02 | 0.71 | 0.57 | 0.78 | 0.98 | 0.82 | 0.16 | 0.25 | 0.83 | 0.17 | 0.19 |
| ***011102*** | 0.88 | 0.64 | 0.46 | 0.25 | 0.13 | 0.52 | 0.34 | 0.66 | 0.11 | 0.05 | 0.08 | 0.36 | 0.77 | 0.11 |
| ***011103*** | 0.75 | 0.38 | 0.74 | 0.01 | 0.25 | 0.09 | 0.22 | 0.16 | 0.62 | 0.31 | 0.30 | 0.25 | 0.77 | 0.24 |
| ***011104*** | 0.03 | 0.00 | 0.54 | 0.85 | 0.24 | 0.10 | 0.08 | 0.77 | 0.02 | 0.02 | 0.62 | 0.34 | 0.53 | 0.74 |
| ***011105*** | 0.55 | 0.04 | 0.51 | 0.90 | 0.70 | 0.30 | 0.69 | 0.60 | 0.47 | 0.21 | 0.03 | 0.06 | 0.71 | 0.00 |
| ***011201*** | 0.09 | 0.06 | 0.55 | 0.51 | 0.89 | 0.01 | 0.84 | 0.64 | 0.17 | 0.43 | 0.03 | 0.63 | 0.79 | 0.49 |
| ***011202*** | 0.09 | 0.00 | 0.15 | 0.17 | 0.25 | 0.04 | 0.27 | 0.96 | 0.21 | 0.42 | 0.42 | 0.42 | 0.07 | 0.14 |
| ***011203*** | 0.75 | 0.47 | 0.11 | 0.27 | 0.61 | 0.49 | 0.73 | 0.12 | 0.20 | 0.23 | 0.09 | 0.74 | 0.17 | 0.84 |
| ***011204*** | 0.42 | 0.54 | 0.59 | 0.41 | 0.42 | 0.18 | 0.03 | 0.98 | 0.39 | 0.40 | 0.07 | 0.63 | 0.69 | 0.41 |
| ***011205*** | 0.50 | 0.15 | 0.11 | 0.01 | 0.63 | 0.33 | 0.36 | 0.04 | 0.75 | 0.40 | 0.51 | 0.73 | 0.35 | 0.00 |
| ***021301*** | 0.62 | 0.36 | 0.01 | 0.00 | 0.02 | 0.61 | 0.12 | 0.50 | 0.09 | 0.14 | 0.14 | 0.03 | 0.18 | 0.03 |
| ***021303*** | 0.05 | 0.25 | 0.00 | 0.00 | 0.17 | 0.82 | 0.07 | 0.30 | 0.12 | 0.41 | 0.17 | 0.56 | 0.32 | 0.23 |

| ID | 212 1 | 221 1 | 222 1 | 311 1 | 312 1 | 321 1 | 322 1 | 111 1 | 113 1 | 113 2 | 113 3 | 123 1 | 123 2 | 123 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **021304** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| **021305** | n/d | n/d | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | n/d | n/d | n/d | n/d | 0.00 |
| **021401** | 0.46 | 0.84 | 0.12 | 0.24 | 0.03 | 0.82 | 0.55 | 0.09 | 0.58 | 0.18 | 0.15 | 0.07 | 0.01 | 0.56 |
| **021403** | 0.25 | 0.53 | 0.32 | 0.08 | 0.07 | 0.09 | 0.93 | 0.52 | 0.47 | 0.14 | 0.47 | 0.12 | 0.37 | 0.97 |
| **021404** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| **021405** | n/d | n/d | n/d | n/d | n/d | 0.00 | n/d | 0.00 | n/d | n/d | 0.00 | n/d | n/d | n/d |
| **021501** | 0.36 | 0.49 | 0.90 | 0.25 | 0.49 | 0.11 | 0.03 | 0.35 | 0.42 | 0.03 | 0.60 | 0.34 | 0.23 | 0.14 |
| **021502** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| **021503** | 0.15 | 0.01 | 0.01 | 0.69 | 0.87 | 0.10 | 0.02 | 0.19 | 0.36 | 0.13 | 0.15 | 0.12 | 0.05 | 0.63 |
| **021504** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **021505** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| **030101** | 0.62 | 0.11 | 0.54 | 0.99 | 0.93 | 0.20 | 0.33 | 0.33 | 0.55 | 0.46 | 0.10 | 0.41 | 0.08 | 0.63 |
| **030102** | 0.51 | 0.04 | 0.64 | 0.35 | 0.01 | 0.70 | 0.27 | 0.45 | 0.51 | 0.54 | 0.15 | 0.36 | 0.71 | 0.24 |
| **030103** | 0.35 | 0.66 | 0.97 | 0.47 | 0.60 | 0.14 | 0.81 | 0.62 | 0.53 | 0.31 | 0.19 | 0.51 | 0.16 | 0.51 |
| **030104** | 0.91 | 0.38 | 0.64 | 0.11 | 0.06 | 0.13 | 0.71 | 0.80 | 0.27 | 0.73 | 0.46 | 0.25 | 0.01 | 0.67 |
| **030105** | 0.87 | 0.69 | 0.40 | 0.41 | 0.21 | 0.52 | 0.19 | 0.53 | 0.22 | 0.13 | 0.14 | 0.50 | 0.33 | 0.11 |
| **030106** | 0.68 | 0.52 | 0.12 | 0.52 | 0.37 | 0.30 | 0.26 | 0.35 | 0.26 | 0.22 | 0.21 | 0.54 | 0.36 | 0.54 |
| **030107** | 0.23 | 0.82 | 0.02 | 0.09 | 0.90 | 0.38 | 0.50 | 0.17 | 0.82 | 0.62 | 0.20 | 0.19 | 0.31 | 0.65 |
| **031201** | 0.01 | 0.38 | 0.61 | 0.22 | 0.29 | 0.60 | 0.35 | 0.13 | 0.83 | 0.31 | 0.10 | 0.78 | 0.25 | 0.85 |

| ID | 2121 | 2211 | 2221 | 3111 | 3121 | 3211 | 3221 | 1111 | 1131 | 1132 | 1133 | 1231 | 1232 | 1233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 031202 | 0.40 | 0.16 | 0.02 | 0.02 | 0.28 | 0.04 | 0.06 | 0.02 | 0.05 | 0.01 | 0.02 | 0.66 | 0.01 | 0.00 |
| 031203 | 0.77 | 0.23 | 0.05 | 0.19 | 0.03 | 0.08 | 0.05 | 0.13 | 0.25 | 0.05 | 0.30 | 0.80 | 0.06 | 0.44 |
| 031204 | 0.02 | 0.00 | 0.01 | 0.04 | 0.09 | 0.07 | 0.06 | 0.13 | 0.29 | 0.17 | 0.06 | 0.02 | 0.06 | 0.15 |
| 031205 | 0.01 | 0.12 | 0.54 | 0.22 | 0.08 | 0.06 | 0.52 | 0.28 | 0.19 | 0.00 | 0.39 | 0.00 | 0.00 | 0.00 |
| 031206 | 0.03 | 0.16 | 0.83 | 0.75 | 0.28 | 0.03 | 0.79 | 0.27 | 0.84 | 0.20 | 0.86 | 0.79 | 0.39 | 0.47 |
| 031207 | 0.53 | 0.13 | 0.27 | 0.72 | 0.02 | 0.03 | 0.82 | 0.19 | 0.70 | 0.25 | 0.35 | 0.76 | 0.13 | 0.13 |
| 040101 | 0.64 | 0.59 | 0.03 | 0.38 | 0.10 | 0.48 | 0.21 | 0.77 | 0.82 | 0.75 | 0.28 | 0.21 | 0.66 | 0.39 |
| 040102 | 0.28 | 0.35 | 0.71 | 0.07 | 0.13 | 0.40 | 0.20 | 0.33 | 0.25 | 0.14 | 0.22 | 0.42 | 0.59 | 0.60 |
| 040103 | 0.87 | 0.22 | 0.35 | 0.29 | 0.16 | 0.42 | 0.50 | 0.04 | 0.32 | 0.66 | 0.05 | 0.15 | 0.24 | 0.14 |
| 040104 | 0.45 | 0.06 | 0.56 | 0.23 | 0.02 | 0.67 | 0.49 | 0.26 | 0.56 | 0.26 | 0.17 | 0.72 | 0.08 | 0.61 |
| 040105 | 0.75 | 0.46 | 0.43 | 0.25 | 0.05 | 0.59 | 0.93 | 0.09 | 0.76 | 0.18 | 0.04 | 0.44 | 0.16 | 0.03 |
| 040106 | 0.44 | 0.43 | 0.32 | 0.43 | 0.21 | 0.91 | 0.09 | 0.48 | 0.56 | 0.39 | 0.75 | 0.06 | 0.71 | 0.40 |
| 040107 | 0.36 | 0.10 | 0.43 | 0.36 | 0.47 | 0.07 | 0.21 | 0.44 | 0.60 | 0.11 | 0.02 | 0.93 | 0.69 | 0.13 |
| 041201 | 0.10 | 0.28 | 0.96 | 0.09 | 0.20 | 0.31 | 0.75 | 0.66 | 0.58 | 0.31 | 0.28 | 0.70 | 0.22 | 0.84 |
| 041202 | 0.07 | 0.79 | 0.10 | 0.01 | 0.45 | 0.25 | 0.36 | 0.16 | 0.51 | 0.01 | 0.01 | 0.70 | 0.18 | 0.00 |
| 041203 | 0.57 | 0.55 | 0.00 | 0.87 | 0.69 | 0.35 | 0.50 | 0.51 | 0.31 | 0.61 | 0.05 | 0.88 | 0.31 | 0.36 |
| 041204 | 0.01 | 0.01 | 0.18 | 0.25 | 0.00 | 0.01 | 0.91 | 0.16 | 0.51 | 0.24 | 0.00 | 0.47 | 0.02 | 0.09 |
| 041205 | 0.18 | 0.11 | 0.14 | 0.15 | 0.02 | 0.34 | 0.51 | 0.08 | 0.53 | 0.00 | 0.25 | 0.05 | 0.07 | 0.00 |
| 041206 | 0.47 | 0.12 | 0.28 | 0.14 | 0.56 | 0.10 | 0.79 | 0.51 | 0.24 | 0.25 | 0.15 | 0.67 | 0.29 | 0.47 |

| ID | 2121 | 2211 | 2221 | 3111 | 3121 | 3211 | 3221 | 1111 | 1131 | 1132 | 1133 | 1231 | 1232 | 1233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***041207*** | 0.42 | 0.52 | 0.11 | 0.83 | 0.08 | 0.94 | 0.37 | 0.38 | 0.57 | 0.60 | 0.01 | 0.49 | 0.26 | 0.89 |
| ***051601*** | 0.46 | 0.89 | 0.25 | 0.92 | 0.34 | 0.64 | 0.10 | 0.24 | 0.26 | 0.23 | 0.21 | 0.87 | 0.14 | 0.24 |
| ***051602*** | 0.40 | 0.41 | 0.19 | 0.62 | 0.74 | 0.51 | 0.19 | 0.04 | 0.01 | 0.82 | 0.00 | 0.71 | 0.62 | 0.00 |
| ***051603*** | 0.08 | 0.42 | 0.11 | 0.85 | 0.45 | 0.46 | 0.00 | 0.40 | 0.02 | 0.38 | 0.37 | 0.35 | 0.50 | 0.15 |
| ***051604*** | 0.17 | 0.02 | 0.99 | 0.77 | 0.01 | 0.26 | 0.02 | 0.01 | 0.08 | 0.22 | 0.03 | 0.03 | 0.00 | 0.08 |
| ***051605*** | 0.17 | 0.22 | 0.20 | 0.12 | 0.52 | 0.76 | 0.28 | 0.45 | 0.24 | 0.01 | 0.10 | 0.76 | 0.00 | 0.00 |
| ***051701*** | 0.84 | 0.55 | 0.68 | 0.07 | 0.53 | 0.46 | 0.48 | 0.15 | 0.77 | 0.11 | 0.15 | 0.27 | 0.37 | 0.50 |
| ***051702*** | 0.64 | 0.19 | 0.54 | 0.84 | 0.24 | 0.61 | 0.30 | 0.37 | 0.47 | 0.77 | n/d | 0.61 | 0.85 | 0.01 |
| ***051703*** | 0.42 | 0.26 | 0.52 | 0.23 | 0.23 | 0.60 | 0.42 | 0.11 | 0.10 | 0.19 | 0.01 | 0.40 | 0.26 | 0.34 |
| ***051704*** | 0.00 | 0.00 | 0.00 | 0.41 | 0.01 | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.49 | 0.00 | 0.00 |
| ***051705*** | 0.19 | 0.87 | 0.72 | 0.16 | 0.11 | 0.06 | 0.36 | 0.41 | 0.63 | 0.08 | 0.00 | 0.02 | 0.13 | 0.03 |
| ***061601*** | 0.61 | 0.60 | 0.01 | 0.63 | 0.23 | 0.76 | 0.42 | 0.03 | 0.13 | 0.01 | 0.55 | 0.20 | 0.19 | 0.40 |
| ***061701*** | 0.02 | 0.05 | 0.48 | 0.38 | 0.55 | 0.06 | 0.61 | 0.62 | 0.81 | 0.69 | 0.00 | 0.16 | 0.28 | 0.14 |
| ***071601*** | 0.21 | 0.63 | 0.51 | 0.60 | 0.25 | 0.70 | 0.07 | 0.72 | 0.22 | 0.74 | 0.12 | 0.05 | 0.63 | 0.23 |
| ***071701*** | 0.16 | 0.45 | 0.56 | 0.74 | 0.78 | 0.48 | 0.52 | 0.43 | 0.32 | 0.47 | 0.09 | 0.10 | 0.00 | 0.00 |
| ***081801*** | 0.87 | 0.00 | 0.46 | 0.16 | 0.27 | 0.15 | 0.55 | 0.01 | 0.01 | 0.33 | 0.15 | 0.58 | 0.08 | 0.45 |
| ***081802*** | 0.39 | 0.00 | 0.08 | 0.00 | 0.18 | 0.00 | 0.00 | 0.00 | 0.35 | 0.28 | 0.24 | 0.01 | 0.24 | 0.29 |
| ***081803*** | 0.10 | 0.01 | 0.03 | 0.02 | 0.21 | 0.31 | 0.33 | 0.01 | 0.76 | 0.21 | 0.79 | 0.28 | 0.76 | 0.76 |
| ***081804*** | 0.22 | 0.10 | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.19 |

| ID | 212 1 | 221 1 | 222 1 | 311 1 | 312 1 | 321 1 | 322 1 | 111 1 | 113 1 | 113 2 | 113 3 | 123 1 | 123 2 | 123 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 081805 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.82 | 0.57 | 0.65 | 0.00 | 0.00 | 0.16 |
| 081901 | 0.26 | 0.12 | 0.99 | 0.29 | 0.38 | 0.83 | 0.23 | 0.12 | 0.18 | 0.99 | 0.04 | 0.55 | 0.18 | 0.24 |
| 081902 | 0.16 | n/d | n/d | n/d | 0.60 | n/d | n/d | n/d | 0.41 | 0.51 | 0.22 | n/d | n/d | 0.96 |
| 081903 | 0.01 | 0.14 | 0.24 | 0.67 | 0.62 | 0.59 | 0.64 | 0.13 | 0.03 | 0.23 | 0.07 | 0.61 | 0.24 | 0.27 |
| 081904 | 0.00 | 0.25 | n/d | n/d | 0.02 | 0.02 | n/d | n/d | 0.06 | 0.25 | 0.25 | n/d | 0.02 | 0.00 |
| 081905 | 0.33 | n/d | 0.00 | n/d | 0.01 | n/d | 0.00 | n/d | 0.20 | 0.48 | 0.47 | 0.00 | 0.13 | 0.10 |
| 082002 | n/d | n/d | n/d | n/d | 0.01 | n/d | n/d | n/d | 0.25 | 0.37 | 0.25 | n/d | n/d | 0.67 |
| 082003 | 0.75 | 0.65 | 0.75 | 0.46 | 0.48 | 0.10 | 0.63 | 0.55 | 0.21 | 0.68 | 0.94 | 0.65 | 0.75 | 0.14 |
| 082004 | 0.02 | n/d | n/d | n/d | 0.02 | n/d | n/d | n/d | 0.40 | 0.00 | 0.29 | n/d | 0.00 | 0.01 |
| 082005 | 0.00 | n/d | n/d | n/d | 0.00 | n/d | n/d | n/d | 0.00 | 0.02 | 0.23 | n/d | n/d | 0.13 |
| 082102 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | 0.01 | 0.76 | n/d | n/d | 0.69 |
| 082103 | 0.47 | 0.53 | 0.28 | 0.79 | 0.43 | 0.34 | 0.41 | 0.20 | 0.75 | 0.05 | 0.88 | 0.00 | 0.32 | 0.93 |
| 082104 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | 0.00 | 0.64 | n/d | n/d | 0.03 |
| 082105 | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| 082201 | 0.39 | 0.08 | 0.43 | 0.72 | 0.07 | 0.27 | 0.23 | 0.10 | 0.70 | 0.07 | 0.22 | 0.37 | 0.17 | 0.32 |
| 082202 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 |
| 082203 | 0.25 | 0.02 | 0.26 | 0.02 | 0.01 | 0.21 | 0.25 | 0.20 | 0.28 | 0.18 | 0.44 | 0.88 | 0.16 | 0.32 |
| 082204 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| 082205 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| ID | 2121 | 2211 | 2221 | 3111 | 3121 | 3211 | 3221 | 1111 | 1131 | 1132 | 1133 | 1231 | 1232 | 1233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 082302 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082303 | 0.01 | 0.50 | 0.61 | 0.14 | 0.07 | 0.00 | 0.50 | 0.01 | 0.39 | 0.34 | 0.14 | 0.21 | 0.49 | 0.51 |
| 082304 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082305 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082402 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 |
| 082403 | 0.10 | 0.00 | 0.00 | 0.21 | 0.01 | 0.00 | 0.00 | 0.00 | 0.08 | 0.02 | 0.00 | 0.00 | 0.60 | 0.34 |
| 082404 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 |
| 082405 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082501 | 0.39 | 0.08 | 0.42 | 0.72 | 0.07 | 0.28 | 0.00 | 0.10 | 0.63 | 0.07 | 0.22 | 0.49 | 0.17 | 0.32 |
| 082502 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 | 0.00 |
| 082503 | 0.25 | 0.00 | 0.26 | 0.01 | 0.02 | 0.21 | 0.25 | 0.20 | 0.70 | 0.83 | 0.44 | 0.86 | 0.16 | 0.32 |
| 082504 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082505 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082602 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082603 | 0.01 | 0.50 | 0.55 | 0.14 | 0.59 | 0.00 | 0.50 | 0.01 | 0.39 | 0.13 | 0.07 | 0.26 | 0.32 | 0.37 |
| 082604 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082605 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082702 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 |
| 082703 | 0.00 | 0.00 | 0.00 | 0.21 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.59 | 0.34 |

| *ID* | ***2121*** | ***2211*** | ***2221*** | ***3111*** | ***3121*** | ***3211*** | ***3221*** | ***1111*** | ***1131*** | ***1132*** | ***1133*** | ***1231*** | ***1232*** | ***1233*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***082704*** | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 |
| ***082705*** | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***082801*** | 0.77 | 0.03 | 0.71 | 0.34 | 0.26 | 0.07 | 0.15 | 0.64 | 0.05 | 0.04 | 0.85 | 0.81 | 0.29 | 0.08 |
| ***082802*** | 0.06 | 0.00 | 0.02 | 0.00 | 0.07 | 0.00 | 0.02 | 0.00 | 0.39 | 0.09 | 0.35 | 0.00 | 0.16 | 0.78 |
| ***082803*** | 0.13 | 0.01 | 0.59 | 0.34 | 0.41 | 0.47 | 0.09 | 0.87 | 0.21 | 0.08 | 0.68 | 0.54 | 0.71 | 0.50 |
| ***082804*** | 0.11 | 0.20 | 0.00 | 0.15 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 | 0.26 | 0.13 | 0.00 | 0.64 | 0.10 |
| ***082805*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.09 | 0.86 | 0.01 | 0.00 | 0.00 | 0.00 |
| ***082901*** | 0.51 | 0.01 | 0.42 | 0.02 | 0.40 | 0.00 | 0.06 | 0.10 | 0.80 | 0.74 | 0.28 | 0.08 | 0.82 | 0.36 |
| ***082902*** | 0.05 | n/d | n/d | n/d | 0.00 | n/d | n/d | n/d | 0.49 | 0.05 | 0.06 | n/d | n/d | 0.01 |
| ***082903*** | 0.67 | 0.01 | 0.14 | 0.09 | 0.25 | 0.00 | 0.06 | 0.06 | 0.55 | 0.12 | 0.12 | 0.06 | 0.51 | 0.41 |
| ***082904*** | n/d | n/d | n/d | n/d | n/d | 0.00 | n/d | n/d | 0.00 | 0.01 | 0.20 | n/d | 0.01 | 0.08 |
| ***082905*** | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.01 | 0.00 | 0.06 | 0.00 | 0.00 | 0.03 |
| ***083002*** | 0.09 | n/d | n/d | n/d | 0.00 | n/d | n/d | n/d | 0.07 | 0.17 | 0.14 | 0.00 | n/d | 0.00 |
| ***083003*** | 0.29 | 0.00 | 0.01 | 0.00 | 0.50 | 0.02 | 0.16 | 0.00 | 0.65 | 0.03 | 0.05 | 0.18 | 0.60 | 0.71 |
| ***083004*** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | 0.00 | 0.09 | n/d | 0.00 | n/d |
| ***083005*** | 0.00 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | 0.00 | 0.45 | n/d | n/d | 0.00 |
| ***083102*** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | 0.05 | 0.68 | n/d | n/d | 0.13 |
| ***083103*** | 0.01 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.61 | 0.25 | 0.24 | 0.01 | 0.06 | 0.06 |
| ***083104*** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | 0.10 | n/d | n/d | 0.00 |

| *ID* | ***2121*** | ***2211*** | ***2221*** | ***3111*** | ***3121*** | ***3211*** | ***3221*** | ***1111*** | ***1131*** | ***1132*** | ***1133*** | ***1231*** | ***1232*** | ***1233*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***083105*** | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 |
| ***090101*** | 0.45 | 0.47 | 0.12 | 0.33 | 0.11 | 0.26 | 0.12 | 0.36 | 0.96 | 0.72 | 0.17 | 0.03 | 0.31 | 0.54 |
| ***090102*** | 0.47 | 0.47 | 0.58 | 0.11 | 0.24 | 0.84 | 0.52 | 0.04 | 0.03 | 0.29 | 0.41 | 0.23 | 0.35 | 0.23 |
| ***090103*** | 0.59 | 0.76 | 0.42 | 0.20 | 0.19 | 0.65 | 0.29 | 0.05 | 0.75 | 0.38 | 0.30 | 0.44 | 0.16 | 0.92 |
| ***090104*** | 0.77 | 0.81 | 0.31 | 0.68 | 0.30 | 0.53 | 0.37 | 0.15 | 0.26 | 0.02 | 0.55 | 0.01 | 0.05 | 0.20 |
| ***090105*** | 0.24 | 0.31 | 0.83 | 0.87 | 0.06 | 0.56 | 0.32 | 0.07 | 0.04 | 0.90 | 0.18 | 0.31 | 0.14 | 0.00 |
| ***091201*** | 0.71 | 0.05 | 0.88 | 0.35 | 0.30 | 0.08 | 0.02 | 0.50 | 0.31 | 0.71 | 0.34 | 0.37 | 0.24 | 0.59 |
| ***091202*** | 0.22 | 0.44 | 0.06 | 0.26 | 0.98 | 0.27 | 0.16 | 0.80 | 0.55 | 0.01 | 0.01 | 0.11 | 0.42 | 0.01 |
| ***091203*** | 0.03 | 0.74 | 0.01 | 0.57 | 0.46 | 0.31 | 0.08 | 0.07 | 0.08 | 0.41 | 0.02 | 0.23 | 0.16 | 0.44 |
| ***091204*** | 0.00 | 0.04 | 0.00 | 0.08 | 0.00 | 0.00 | 0.01 | 0.07 | 0.02 | 0.46 | 0.01 | 0.50 | 0.16 | 0.07 |
| ***091205*** | 0.83 | 0.23 | 0.65 | 0.83 | 0.69 | 0.65 | 0.22 | 0.18 | 0.68 | 0.00 | 0.11 | 0.02 | 0.43 | 0.09 |
| ***103201*** | 0.61 | 0.59 | 0.43 | 0.35 | 0.38 | 0.78 | 0.78 | 0.40 | 0.62 | 0.68 | 0.45 | 0.03 | 0.41 | 0.70 |
| ***103202*** | 0.54 | 0.12 | 0.94 | 0.53 | 0.87 | 0.76 | 0.86 | 0.30 | 0.17 | 0.79 | 0.27 | 0.60 | 0.04 | 0.58 |
| ***103203*** | 0.12 | 0.43 | 0.53 | 0.54 | 0.57 | 0.31 | 0.84 | 0.42 | 0.69 | 0.64 | 0.55 | 0.49 | 0.18 | 0.68 |
| ***103204*** | 0.38 | 0.09 | 0.39 | 0.22 | 0.80 | 0.13 | 0.45 | 0.21 | 0.42 | 0.81 | 0.85 | 0.94 | 0.26 | 0.22 |
| ***103205*** | 0.61 | 0.28 | 0.06 | 0.53 | 0.45 | 0.42 | 0.88 | 0.58 | 0.09 | 0.44 | 0.57 | 0.09 | 0.34 | 0.46 |
| ***103301*** | 0.49 | 0.18 | 0.42 | 0.14 | 0.41 | 0.54 | 0.82 | 0.15 | 0.01 | 0.00 | 0.79 | 0.70 | 0.55 | 0.50 |
| ***103302*** | 0.95 | 0.70 | 0.53 | 0.30 | 0.78 | 0.20 | 0.48 | 0.85 | 0.78 | 0.72 | 0.84 | 0.06 | 0.36 | 0.08 |
| ***103303*** | 0.24 | 0.08 | 0.34 | 0.07 | 0.65 | 0.61 | 0.56 | 0.24 | 0.07 | 0.00 | 0.54 | 0.32 | 0.43 | 0.17 |

| ID | 212 1 | 221 1 | 222 1 | 311 1 | 312 1 | 321 1 | 322 1 | 111 1 | 113 1 | 113 2 | 113 3 | 123 1 | 123 2 | 123 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **10330 4** | 0.54 | 0.43 | 0.23 | 0.19 | 0.02 | 0.05 | 0.29 | 0.25 | 0.68 | 0.25 | 0.23 | 0.40 | 0.32 | 0.11 |
| **10330 5** | 0.38 | 0.72 | 0.15 | 0.35 | 0.31 | 0.31 | 0.33 | 0.04 | 0.94 | 0.26 | 0.39 | 0.34 | 0.76 | 0.87 |
| **11010 1** | 0.10 | 0.49 | 0.08 | 0.26 | 0.62 | 0.09 | 0.56 | 0.22 | 0.68 | 0.49 | 0.36 | 0.80 | 0.02 | 0.16 |
| **11010 2** | 0.09 | 0.27 | 0.48 | 0.00 | 0.78 | 0.09 | 0.63 | 0.00 | 0.04 | 0.34 | 0.06 | 0.08 | 0.03 | 0.00 |
| **11010 3** | 0.19 | 0.77 | 0.73 | 0.11 | 0.33 | 0.47 | 0.68 | 0.75 | 0.32 | 0.06 | 0.97 | 0.72 | 0.27 | 0.27 |
| **11010 4** | 0.36 | 0.00 | 0.40 | 0.28 | 0.05 | 0.82 | 0.12 | 0.76 | 0.51 | 0.06 | 0.01 | 0.21 | 0.02 | 0.40 |
| **11010 5** | 0.03 | 0.27 | 0.44 | 0.48 | 0.59 | 0.47 | 0.54 | 0.85 | 0.72 | 0.04 | 0.45 | 0.00 | 0.28 | 0.01 |
| **11120 1** | 0.10 | 0.42 | 0.57 | 0.91 | 0.05 | 0.53 | 0.04 | 0.08 | 0.85 | 0.05 | 0.09 | 0.67 | 0.41 | 0.37 |
| **11120 2** | 0.02 | 0.08 | 0.00 | 0.00 | 0.52 | 0.64 | 0.05 | 0.00 | 0.09 | 0.00 | 0.02 | 0.01 | 0.01 | 0.07 |
| **11120 3** | 0.35 | 0.52 | 0.01 | 0.76 | 0.00 | 0.25 | 0.12 | 0.04 | 0.02 | 0.03 | 0.51 | 0.09 | 0.06 | 0.49 |
| **11120 4** | 0.00 | 0.00 | 0.09 | 0.02 | 0.00 | 0.13 | 0.27 | 0.23 | 0.01 | 0.12 | 0.02 | 0.18 | 0.17 | 0.14 |
| **11120 5** | 0.00 | 0.00 | 0.29 | 0.05 | 0.06 | 0.43 | 0.48 | 0.52 | 0.00 | 0.00 | 0.47 | 0.00 | 0.01 | 0.00 |
| **11340 1** | 0.92 | 0.15 | 0.04 | 0.69 | 0.42 | 0.03 | 0.63 | 0.18 | 0.66 | 0.60 | 0.09 | 0.32 | 0.15 | 0.02 |
| **11340 2** | 0.65 | 0.31 | 0.00 | 0.02 | 0.15 | 0.02 | 0.00 | 0.86 | 0.13 | 0.03 | 0.02 | 0.00 | 0.00 | 0.06 |
| **11340 3** | 0.05 | 0.70 | 0.53 | 0.34 | 0.69 | 0.54 | 0.42 | 0.78 | 0.67 | 0.25 | 0.82 | 0.55 | 0.38 | 0.17 |
| **11340 4** | 0.16 | 0.18 | 0.02 | 0.25 | 0.13 | 0.70 | 0.56 | 0.19 | 0.45 | 0.02 | 0.13 | 0.19 | 0.25 | 0.02 |
| **11340 5** | 0.03 | 0.46 | 0.00 | 0.14 | 0.02 | 0.11 | 0.13 | 0.06 | 0.37 | 0.51 | 0.08 | 0.32 | 0.00 | 0.18 |
| **12010 1** | 0.53 | 0.75 | 0.35 | 0.02 | 0.39 | 0.97 | 0.37 | 0.68 | 0.22 | 0.25 | 0.03 | 0.44 | 0.08 | 0.66 |
| **12010 2** | 0.47 | 0.22 | 0.04 | 0.04 | 0.11 | 0.12 | 0.04 | 0.52 | 0.06 | 0.11 | 0.42 | 0.16 | 0.02 | 0.00 |

| ID | 2121 | 2211 | 2221 | 3111 | 3121 | 3211 | 3221 | 1111 | 1131 | 1132 | 1133 | 1231 | 1232 | 1233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 120103 | 0.73 | 0.60 | 0.18 | 0.92 | 0.52 | 0.77 | 0.68 | 0.44 | 0.41 | 0.31 | 0.53 | 0.43 | 0.25 | 0.47 |
| 120104 | 0.05 | 0.06 | 0.54 | 0.46 | 0.01 | 0.01 | 0.25 | 0.03 | 0.21 | 0.20 | 0.00 | 0.39 | 0.36 | 0.02 |
| 120105 | 0.02 | 0.50 | 0.33 | 0.51 | 0.04 | 0.57 | 0.40 | 0.16 | 0.01 | 0.00 | 0.62 | 0.02 | 0.47 | 0.38 |
| 121201 | 0.33 | 0.11 | 0.17 | 0.56 | 0.11 | 0.00 | 0.07 | 0.36 | 0.26 | 0.06 | 0.72 | 0.36 | 0.04 | 0.38 |
| 121202 | 0.45 | 0.00 | 0.00 | 0.17 | 0.19 | 0.05 | 0.29 | 0.03 | 0.09 | 0.08 | 0.29 | 0.78 | 0.15 | 0.00 |
| 121203 | 0.08 | 0.30 | 0.00 | 0.63 | 0.12 | 0.01 | 0.17 | 0.01 | 0.45 | 0.00 | 0.23 | 0.56 | 0.01 | 0.49 |
| 121204 | 0.10 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.09 | 0.01 | 0.23 | 0.25 | 0.13 | 0.19 | 0.04 | 0.32 |
| 121205 | 0.06 | 0.01 | 0.28 | 0.02 | 0.01 | 0.25 | 0.06 | 0.04 | 0.00 | 0.00 | 0.47 | 0.00 | 0.34 | 0.00 |
| 123401 | 0.08 | 0.67 | 0.15 | 0.95 | 0.80 | 0.33 | 0.07 | 0.25 | 0.08 | 0.13 | 0.27 | 0.05 | 0.03 | 0.58 |
| 123402 | 0.47 | 0.58 | 0.00 | 0.00 | 0.00 | 0.59 | 0.00 | 0.00 | 0.00 | 0.04 | 0.50 | 0.00 | 0.36 | 0.16 |
| 123403 | 0.50 | 0.41 | 0.95 | 0.52 | 0.95 | 0.36 | 0.90 | 0.54 | 0.44 | 0.53 | 0.18 | 0.21 | 0.24 | 0.81 |
| 123404 | 0.06 | 0.54 | 0.04 | 0.00 | 0.19 | 0.21 | 0.29 | 0.02 | 0.11 | 0.46 | 0.53 | 0.07 | 0.88 | 0.20 |
| 123405 | 0.03 | 0.15 | 0.52 | 0.40 | 0.20 | 0.16 | 0.21 | 0.45 | 0.41 | 0.34 | 0.59 | 0.32 | 0.00 | 0.22 |
| 130101 | 0.37 | 0.67 | 0.87 | 0.66 | 0.21 | 0.26 | 0.00 | 0.07 | 0.31 | 0.00 | 0.50 | 0.58 | 0.63 | 0.01 |
| 130102 | 0.28 | 0.15 | 0.13 | 0.10 | 0.03 | 0.19 | 0.41 | 0.07 | 0.31 | 0.10 | 0.97 | 0.50 | 0.88 | 0.42 |
| 130103 | 0.11 | 0.45 | 0.50 | 0.75 | 0.46 | 0.40 | 0.11 | 0.02 | 0.31 | 0.19 | 0.45 | 0.64 | 0.42 | 0.07 |
| 130104 | 0.31 | 0.23 | 0.21 | 0.86 | 0.38 | 0.24 | 0.47 | 0.48 | 0.59 | 0.54 | 0.63 | 0.46 | 0.08 | 0.65 |
| 130105 | 0.47 | 0.68 | 0.23 | 0.11 | 0.70 | 0.46 | 0.13 | 0.52 | 0.13 | 0.42 | 0.96 | 0.57 | 0.23 | 0.44 |
| 131201 | 0.70 | 0.51 | 0.40 | 0.90 | 0.08 | 0.82 | 0.57 | 0.04 | 0.04 | 0.01 | 0.31 | 0.23 | 0.55 | 0.28 |

| ID | 2121 | 2211 | 2221 | 3111 | 3121 | 3211 | 3221 | 1111 | 1131 | 1132 | 1133 | 1231 | 1232 | 1233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 131202 | 0.12 | 0.50 | 0.67 | 0.87 | 0.01 | 0.46 | 0.65 | 0.02 | 0.26 | 0.12 | 0.26 | 0.51 | 0.11 | 0.20 |
| 131203 | 0.11 | 0.53 | 0.81 | 0.92 | 0.12 | 0.61 | 0.35 | 0.08 | 0.00 | 0.25 | 0.13 | 0.10 | 0.61 | 0.08 |
| 131204 | 0.29 | 0.39 | 0.33 | 0.06 | 0.18 | 0.27 | 0.07 | 0.06 | 0.35 | 0.45 | 0.07 | 0.01 | 0.04 | 0.09 |
| 131205 | 0.30 | 0.09 | 0.14 | 0.49 | 0.36 | 0.21 | 0.85 | 0.05 | 0.57 | 0.21 | 0.31 | 0.89 | 0.73 | 0.02 |
| 143501 | 0.09 | 0.74 | 0.12 | 0.48 | 0.31 | 0.26 | 0.22 | 0.69 | 0.59 | 0.14 | 0.52 | 0.22 | 0.32 | 0.15 |
| 153501 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| 163601 | 0.61 | 0.55 | 0.15 | 0.03 | 0.79 | 0.77 | 0.97 | 0.61 | 0.30 | 0.75 | 0.59 | 0.45 | 0.13 | 0.08 |
| 163602 | 0.07 | 0.47 | 0.55 | 0.84 | 0.28 | 0.07 | 0.03 | 0.12 | 0.57 | 0.07 | 0.63 | 0.38 | 0.34 | 0.82 |
| 163603 | 0.58 | 0.52 | 0.49 | 0.07 | 0.83 | 0.50 | 0.73 | 0.45 | 0.78 | 0.10 | 0.79 | 0.19 | 0.69 | 0.34 |
| 163604 | 0.93 | 0.12 | 0.19 | 0.55 | 0.46 | 0.90 | 0.26 | 0.57 | 0.18 | 0.52 | 0.78 | 0.33 | 0.82 | 0.68 |
| 163605 | 0.14 | 0.43 | 0.88 | 0.46 | 0.02 | 0.69 | 0.29 | 0.34 | 0.49 | 0.51 | 0.26 | 0.95 | 0.40 | 0.93 |
| 163701 | 0.51 | 0.00 | 0.14 | 0.00 | 0.46 | 0.03 | 0.32 | 0.00 | 0.27 | 0.05 | 0.01 | 0.82 | 0.74 | 0.79 |
| 163702 | 0.02 | 0.02 | 0.54 | 0.27 | 0.87 | 0.25 | 0.40 | 0.02 | 0.09 | 0.00 | 0.08 | 0.59 | 0.16 | 0.75 |
| 163703 | 0.29 | 0.00 | 0.79 | 0.00 | 0.63 | 0.03 | 0.28 | 0.00 | 0.83 | 0.37 | 0.01 | 0.81 | 0.86 | 0.39 |
| 163704 | 0.02 | 0.40 | 0.30 | 0.00 | 0.38 | 0.94 | 0.62 | 0.11 | 0.25 | 0.47 | 0.45 | 0.91 | 0.90 | 0.50 |
| 163705 | 0.45 | 0.61 | 0.26 | 0.07 | 0.11 | 0.33 | 0.28 | 0.72 | 0.02 | 0.01 | 0.13 | 0.70 | 0.02 | 0.03 |
| 163801 | 0.32 | 0.00 | 0.19 | 0.00 | 0.31 | 0.15 | 0.77 | 0.05 | 0.57 | 0.18 | 0.01 | 0.71 | 0.31 | 0.25 |
| 163802 | 0.57 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 | 0.00 | 0.00 | 0.31 | 0.02 | 0.15 | 0.00 | 0.39 | 0.58 |
| 163803 | 0.69 | 0.00 | 0.50 | 0.01 | 0.00 | 0.10 | 0.64 | 0.01 | 0.84 | 0.74 | 0.26 | 0.88 | 0.78 | 0.44 |

| ID | 2121 | 2211 | 2221 | 3111 | 3121 | 3211 | 3221 | 1111 | 1131 | 1132 | 1133 | 1231 | 1232 | 1233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 163804 | 0.32 | 0.05 | 0.00 | 0.01 | 0.90 | 0.33 | 0.00 | 0.00 | 0.01 | 0.37 | 0.17 | 0.00 | 0.08 | 0.08 |
| 163805 | 0.01 | 0.00 | 0.20 | 0.00 | 0.01 | 0.00 | 0.23 | 0.00 | 0.03 | 0.43 | 0.00 | 0.01 | 0.25 | n/d |
| 163901 | 0.29 | 0.00 | 0.07 | 0.00 | 0.15 | 0.02 | 0.22 | 0.00 | 0.09 | 0.14 | 0.02 | 0.02 | 0.00 | 0.51 |
| 163902 | 0.34 | 0.00 | 0.00 | 0.00 | 0.22 | 0.00 | 0.00 | 0.00 | 0.07 | 0.25 | 0.42 | 0.00 | 0.02 | 0.86 |
| 163903 | 0.67 | 0.00 | 0.06 | 0.00 | 0.10 | 0.01 | 0.22 | 0.00 | 0.07 | 0.14 | 0.01 | 0.04 | 0.01 | 0.60 |
| 163904 | 0.01 | 0.09 | 0.00 | 0.05 | 0.57 | 0.01 | 0.00 | 0.01 | 0.16 | 0.43 | 0.02 | 0.00 | 0.26 | 0.01 |
| 163905 | 0.49 | 0.00 | 0.02 | 0.00 | 0.34 | 0.00 | 0.01 | 0.00 | 0.75 | 0.49 | n/d | 0.01 | 0.02 | n/d |
| 171601 | 0.58 | 0.52 | 0.70 | 0.66 | 0.47 | 0.08 | 0.04 | 0.64 | 0.30 | 0.09 | 0.44 | 0.42 | 0.24 | 0.42 |
| 171602 | 0.13 | 0.00 | 0.06 | 0.65 | 0.11 | 0.00 | 0.45 | 0.50 | 0.67 | 0.42 | 0.00 | 0.75 | 0.62 | 0.00 |
| 171603 | 0.02 | 0.15 | 0.66 | 0.35 | 0.29 | 0.15 | 0.65 | 0.58 | 0.47 | 0.02 | 0.36 | 0.14 | 0.04 | 0.22 |
| 171604 | 0.00 | 0.00 | 0.07 | 0.11 | 0.00 | 0.00 | 0.01 | 0.00 | 0.06 | 0.00 | 0.00 | 0.49 | 0.01 | 0.00 |
| 171605 | 0.00 | 0.05 | 0.32 | 0.16 | 0.01 | 0.20 | 0.00 | 0.05 | n/d | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| 171701 | 0.58 | 0.75 | 0.07 | 0.02 | 0.08 | 0.16 | 0.19 | 0.24 | 0.36 | 0.00 | 0.04 | 0.26 | 0.02 | 0.24 |
| 171702 | 0.01 | 0.51 | 0.31 | 0.20 | 0.03 | 0.01 | 0.13 | 0.82 | 0.15 | 0.19 | 0.00 | 0.95 | 0.37 | 0.00 |
| 171703 | 0.23 | 0.87 | 0.23 | 0.28 | 0.51 | 0.86 | 0.07 | 0.05 | 0.95 | 0.01 | 0.33 | 0.06 | 0.00 | 0.05 |
| 171704 | 0.00 | n/d | 0.03 | 0.00 | 0.00 | 0.01 | 0.01 | 0.02 | 0.01 | 0.04 | 0.00 | 0.04 | 0.02 | 0.00 |
| 171705 | 0.00 | 0.00 | 0.13 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| 174001 | 0.60 | 0.03 | 0.02 | 0.22 | 0.01 | 0.13 | 0.02 | 0.02 | 0.00 | 0.06 | 0.01 | 0.54 | 0.02 | 0.60 |
| 174002 | 0.01 | 0.02 | 0.00 | 0.00 | 0.08 | 0.12 | 0.02 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.06 | 0.00 |

| ID | 212 1 | 221 1 | 222 1 | 311 1 | 312 1 | 321 1 | 322 1 | 111 1 | 113 1 | 113 2 | 113 3 | 123 1 | 123 2 | 123 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17400 3 | 0.07 | 0.38 | 0.35 | 0.65 | 0.27 | 0.32 | 0.01 | 0.00 | 0.16 | 0.02 | 0.53 | 0.65 | 0.00 | 0.22 |
| 17400 4 | 0.00 | 0.00 | 0.03 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.24 | 0.00 | 0.00 |
| 17400 5 | 0.04 | 0.02 | 0.46 | 0.02 | 0.00 | 0.00 | 0.05 | 0.00 | 0.02 | 0.01 | 0.01 | 0.08 | 0.02 | 0.01 |
| 17410 1 | 0.14 | 0.38 | 0.19 | 0.65 | 0.46 | 0.66 | 0.01 | 0.97 | 0.63 | 0.05 | 0.04 | 0.16 | 0.02 | 0.03 |
| 17410 2 | 0.09 | 0.01 | 0.06 | 0.13 | 0.01 | 0.02 | 0.17 | 0.65 | 0.45 | 0.20 | 0.11 | 0.56 | 0.09 | 0.20 |
| 17410 3 | 0.55 | 0.99 | 0.62 | 0.13 | 0.64 | 0.41 | 0.48 | 0.77 | 0.11 | 0.15 | 0.05 | 0.09 | 0.14 | 0.08 |
| 17410 4 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 |
| 17410 5 | 0.00 | 0.00 | 0.00 | 0.06 | n/d | 0.08 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | n/d | 0.00 | 0.01 |
| 17420 1 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | n/d | 0.66 | 0.03 | 0.00 | 0.14 |
| 17420 2 | 0.04 | 0.00 | 0.00 | 0.00 | 0.01 | 0.14 | 0.03 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.03 | 0.00 |
| 17420 3 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.04 | n/d | 0.32 | 0.08 | 0.00 | 0.26 |
| 17420 4 | n/d | n/d | 0.05 | 0.00 | 0.00 | 0.03 | 0.01 | 0.04 | 0.00 | 0.08 | 0.00 | 0.03 | 0.00 | 0.00 |
| 17420 5 | 0.16 | 0.02 | 0.08 | 0.02 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 |
| 17430 1 | 0.29 | 0.60 | 0.77 | 0.10 | 0.37 | 0.78 | 0.06 | 0.15 | 0.21 | 0.40 | 0.64 | 0.25 | 0.44 | 0.02 |
| 17430 2 | 0.51 | 0.63 | 0.06 | 0.22 | 0.03 | 0.12 | 0.04 | 0.84 | 0.80 | 0.24 | 0.01 | 0.87 | 0.23 | 0.02 |
| 17430 3 | 0.38 | 0.26 | 0.51 | 0.38 | 0.48 | 0.68 | 0.12 | 0.36 | 0.30 | 0.16 | 0.57 | 0.45 | 0.72 | 0.08 |
| 17430 4 | 0.01 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 |
| 17430 5 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 | n/d | 0.00 | 0.00 |
| 18440 1 | 0.00 | 0.00 | n/d | 0.00 | 0.02 | 0.00 | 0.02 | 0.00 | 0.00 | 0.01 | n/d | 0.00 | n/d | 0.00 |

| ID | 212 1 | 221 1 | 222 1 | 311 1 | 312 1 | 321 1 | 322 1 | 111 1 | 113 1 | 113 2 | 113 3 | 123 1 | 123 2 | 123 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***184402*** | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.00 | 0.00 | 0.00 | n/d | n/d | 0.00 | 0.00 | n/d | n/d |
| ***184403*** | 0.00 | 0.00 | n/d | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | n/d | 0.00 | n/d | 0.00 |
| ***184404*** | 0.01 | 0.00 | n/d | n/d | 0.02 | n/d | 0.00 | 0.00 | 0.01 | n/d | 0.00 | 0.00 | n/d | 0.01 |
| ***184405*** | 0.00 | n/d | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.01 | n/d | 0.00 | 0.00 | n/d |
| ***190101*** | 0.04 | 0.50 | 0.51 | 0.55 | 0.56 | 0.09 | 0.45 | 0.27 | 0.67 | 0.07 | 0.44 | 0.58 | 0.17 | 0.16 |
| ***190102*** | 0.53 | n/d | 0.12 | n/d | 0.07 | n/d | 0.33 | n/d | 0.73 | 0.00 | 0.06 | 0.93 | 0.31 | 0.47 |
| ***190103*** | 0.15 | 0.60 | 0.53 | 0.56 | 0.05 | 0.09 | 0.20 | 0.83 | 0.83 | 0.62 | 0.18 | 0.39 | 0.15 | 0.17 |
| ***190104*** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | 0.07 | n/d | n/d |
| ***190105*** | 0.14 | n/d | 0.39 | n/d | 0.47 | n/d | 0.01 | n/d | 0.41 | 0.02 | 0.35 | 0.11 | 0.05 | 0.11 |
| ***191201*** | 0.09 | 0.69 | 0.52 | 0.75 | 0.02 | 0.70 | 0.02 | 0.25 | 0.90 | 0.03 | 0.08 | 0.01 | 0.19 | 0.53 |
| ***191202*** | 0.00 | n/d | 0.15 | n/d | 0.19 | n/d | 0.04 | n/d | 0.37 | 0.04 | 0.02 | 0.11 | 0.01 | 0.04 |
| ***191203*** | 0.63 | 0.68 | 0.21 | 0.51 | 0.30 | 0.47 | 0.05 | 0.38 | 0.74 | 0.36 | 0.04 | 0.31 | 0.04 | 0.29 |
| ***191204*** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| ***191205*** | 0.00 | n/d | 0.00 | n/d | 0.01 | n/d | 0.00 | n/d | 0.00 | 0.03 | 0.02 | 0.14 | 0.02 | 0.01 |
| ***193402*** | 0.00 | 0.00 | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***193403*** | 0.64 | 0.62 | 0.12 | 0.05 | 0.56 | 0.72 | 0.55 | 0.60 | 0.81 | 0.40 | 0.37 | 0.08 | 0.19 | 0.11 |
| ***193404*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***193405*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***194501*** | 0.85 | 0.05 | 0.20 | 0.48 | 0.03 | 0.03 | 0.46 | 0.05 | 0.46 | 0.31 | 0.46 | 0.07 | 0.95 | 0.19 |

| ID | 2121 | 2211 | 2221 | 3111 | 3121 | 3211 | 3221 | 1111 | 1131 | 1132 | 1133 | 1231 | 1232 | 1233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 194601 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 | 0.00 | 0.00 | 0.00 |
| 194701 | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | n/d | 0.00 | 0.00 |
| 194801 | 0.85 | 0.05 | 0.20 | 0.49 | 0.03 | 0.03 | 0.46 | 0.04 | 0.10 | 0.31 | 0.46 | 0.07 | 0.87 | 0.20 |
| 194802 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194803 | 0.64 | 0.61 | 0.54 | 0.05 | 0.56 | 0.71 | 0.09 | 0.60 | 0.81 | 0.03 | 0.36 | 0.08 | 0.19 | 0.11 |
| 194804 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194805 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194901 | 0.02 | 0.59 | 0.25 | 0.07 | 0.29 | 0.72 | 0.42 | 0.30 | 0.03 | 0.62 | 0.93 | 0.40 | 0.41 | 0.44 |
| 194902 | 0.07 | 0.00 | 0.55 | 0.00 | 0.45 | 0.00 | 0.10 | 0.00 | 0.16 | 0.85 | 0.14 | 0.17 | 0.02 | 0.04 |
| 194903 | 0.25 | 0.29 | 0.67 | 0.01 | 0.30 | 0.25 | 0.12 | 0.56 | 0.73 | 0.11 | 0.81 | 0.42 | 0.76 | 0.64 |
| 194904 | 0.04 | 0.01 | 0.03 | 0.01 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.15 | 0.00 |
| 194905 | 0.23 | 0.00 | 0.20 | 0.00 | 0.27 | 0.09 | 0.45 | 0.00 | 0.13 | 0.11 | 0.03 | 0.36 | 0.09 | 0.32 |
| 205001 | 0.18 | 0.65 | 0.48 | 0.26 | 0.55 | 0.13 | 0.80 | 0.57 | 0.44 | 0.84 | 0.24 | 0.86 | 0.95 | 0.37 |
| 205002 | 0.04 | n/d | 0.12 | n/d | 0.23 | n/d | n/d | n/d | 0.01 | 0.40 | 0.36 | 0.66 | 0.61 | 0.23 |
| 205003 | 0.45 | 0.72 | 0.70 | 0.50 | 0.19 | 0.02 | 0.07 | 0.69 | 0.60 | 0.62 | 0.02 | 0.78 | 0.33 | 0.69 |
| 205004 | 0.31 | 0.65 | n/d | n/d | 0.22 | 0.27 | n/d | n/d | 0.70 | 0.13 | 0.26 | n/d | 0.23 | 0.41 |
| 205005 | 0.03 | n/d | 0.09 | n/d | 0.19 | n/d | 0.12 | n/d | 0.07 | 0.60 | 0.89 | 0.32 | 0.05 | 0.16 |
| 205101 | 0.39 | 0.02 | 0.09 | 0.16 | 0.19 | 0.00 | 0.24 | 0.21 | 0.22 | 0.33 | 0.16 | 0.52 | 0.09 | 0.48 |
| 205102 | 0.21 | n/d | n/d | n/d | 0.00 | n/d | n/d | n/d | 0.00 | 0.05 | 0.46 | 0.02 | n/d | 0.05 |

| *ID* | ***2121*** | ***2211*** | ***2221*** | ***3111*** | ***3121*** | ***3211*** | ***3221*** | ***1111*** | ***1131*** | ***1132*** | ***1133*** | ***1231*** | ***1232*** | ***1233*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***205103*** | 0.07 | 0.00 | 0.68 | 0.16 | 0.50 | 0.05 | 0.05 | 0.30 | 0.65 | 0.38 | 0.38 | 0.62 | 0.40 | 0.64 |
| ***205104*** | 0.00 | 0.03 | n/d | n/d | 0.26 | 0.00 | n/d | n/d | 0.03 | 0.01 | 0.22 | n/d | 0.00 | 0.16 |
| ***205105*** | 0.15 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.04 | 0.66 | 0.02 | 0.00 | 0.01 | 0.02 |
| ***205201*** | 0.90 | 0.35 | 0.89 | 0.73 | 0.33 | 0.38 | 0.31 | 0.69 | 0.64 | 0.16 | 0.33 | 0.38 | 0.22 | 0.01 |
| ***205202*** | 0.70 | n/d | n/d | n/d | 0.01 | n/d | n/d | n/d | 0.84 | 0.06 | 0.45 | 0.05 | 0.05 | 0.05 |
| ***205203*** | 0.34 | 0.44 | 0.88 | 0.05 | 0.21 | 0.73 | 0.55 | 0.46 | 0.43 | 0.77 | 0.34 | 0.79 | 0.26 | 0.10 |
| ***205204*** | 0.73 | 0.59 | n/d | 0.76 | 0.63 | 0.10 | n/d | n/d | 0.49 | 0.33 | 0.14 | n/d | 0.20 | 0.16 |
| ***205205*** | 0.22 | n/d | 0.52 | n/d | 0.28 | n/d | 0.13 | n/d | 0.54 | 0.48 | 0.15 | 0.23 | 0.61 | 0.17 |
| ***205301*** | 0.90 | 0.00 | 0.70 | 0.57 | 0.20 | 0.17 | 0.81 | 0.21 | 0.47 | 0.31 | 0.40 | 0.10 | 0.30 | 0.45 |
| ***205302*** | 0.40 | n/d | n/d | n/d | 0.07 | n/d | n/d | n/d | 0.60 | 0.28 | 0.74 | 0.00 | 0.01 | 0.94 |
| ***205303*** | 0.05 | 0.01 | 0.33 | 0.37 | 0.50 | 0.06 | 0.03 | 0.35 | 0.86 | 0.34 | 0.87 | 0.92 | 0.39 | 0.34 |
| ***205304*** | 0.06 | n/d | n/d | 0.06 | 0.12 | 0.00 | n/d | n/d | 0.00 | 0.14 | 0.07 | n/d | 0.01 | 0.10 |
| ***205305*** | 0.38 | n/d | 0.02 | n/d | 0.63 | n/d | 0.01 | n/d | 0.36 | 0.01 | 0.32 | 0.00 | 0.03 | 0.21 |
| ***205401*** | 0.48 | 0.00 | 0.01 | 0.48 | 0.02 | 0.86 | 0.05 | 0.12 | 0.00 | 0.11 | 0.00 | 0.50 | 0.00 | 0.65 |
| ***205402*** | 0.00 | n/d | n/d | n/d | 0.00 | n/d | n/d | n/d | 0.62 | 0.00 | 0.00 | 0.00 | n/d | 0.03 |
| ***205403*** | 0.52 | 0.00 | 0.60 | 0.03 | 0.26 | 0.25 | 0.00 | 0.00 | 0.53 | 0.65 | 0.00 | 0.02 | 0.68 | 0.33 |
| ***205404*** | n/d | n/d | n/d | n/d | n/d | 0.00 | n/d | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.19 |
| ***205405*** | 0.00 | n/d | n/d | n/d | 0.00 | n/d | n/d | n/d | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.02 |
| ***205501*** | 0.76 | 0.07 | 0.93 | 0.18 | 0.09 | 0.10 | 0.59 | 0.11 | 0.20 | 0.66 | 0.31 | 0.87 | 0.32 | 0.02 |

| ID | 212 1 | 221 1 | 222 1 | 311 1 | 312 1 | 321 1 | 322 1 | 111 1 | 113 1 | 113 2 | 113 3 | 123 1 | 123 2 | 123 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **205502** | 0.31 | n/d | n/d | n/d | 0.14 | n/d | n/d | n/d | 0.09 | 0.61 | 0.00 | 0.00 | 0.01 | 0.49 |
| **205503** | 0.08 | 0.59 | 0.67 | 0.04 | 0.62 | 0.16 | 0.59 | 0.91 | 0.68 | 0.14 | 0.00 | 0.33 | 0.16 | 0.14 |
| **205504** | n/d | 0.02 | n/d | n/d | 0.03 | 0.00 | n/d | n/d | 0.01 | 0.73 | 0.05 | n/d | 0.02 | 0.17 |
| **205505** | 0.26 | n/d | 0.16 | n/d | 0.60 | n/d | 0.03 | n/d | 0.70 | 0.01 | 0.52 | 0.00 | 0.29 | 0.11 |
| **205601** | 0.69 | 0.23 | 0.39 | 0.31 | 0.68 | 0.55 | 0.88 | 0.18 | 0.26 | 0.51 | 0.11 | 0.82 | 0.72 | 0.27 |
| **205602** | 0.10 | 0.00 | 0.00 | 0.00 | 0.78 | 0.00 | 0.00 | 0.00 | 0.57 | 0.72 | 0.32 | 0.04 | 0.00 | 0.25 |
| **205603** | 0.55 | 0.54 | 0.79 | 0.30 | 0.47 | 0.93 | 0.89 | 0.81 | 0.59 | 0.25 | 0.32 | 0.08 | 0.21 | 0.90 |
| **205604** | 0.32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.09 | 0.01 | 0.00 | 0.00 | 0.09 |
| **205605** | 0.05 | 0.00 | 0.43 | 0.00 | 0.17 | 0.00 | 0.30 | 0.00 | 0.61 | 0.39 | 0.14 | 0.39 | 0.20 | 0.57 |
| **205701** | 0.81 | 0.01 | 0.22 | 0.79 | 0.48 | 0.07 | 0.68 | 0.36 | 0.32 | 0.24 | 0.47 | 0.11 | 0.35 | 0.25 |
| **205702** | 0.11 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 0.00 | 0.00 | 0.07 | 0.12 | 0.39 | 0.00 | 0.62 | 0.17 |
| **205703** | 0.55 | 0.00 | 0.43 | 0.18 | 0.59 | 0.44 | 0.33 | 0.07 | 0.14 | 0.51 | 0.49 | 0.83 | 0.40 | 0.84 |
| **205704** | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 | 0.05 | 0.00 | 0.05 | 0.00 | 0.18 | 0.47 | 0.00 | 0.00 | 0.01 |
| **205705** | 0.40 | 0.00 | 0.02 | 0.00 | 0.02 | 0.00 | 0.02 | 0.00 | 0.19 | 0.14 | 0.75 | 0.00 | 0.00 | 0.01 |
| **205801** | 0.23 | 0.69 | 0.44 | 0.99 | 0.55 | 0.13 | 0.35 | 0.78 | 0.55 | 0.51 | 0.48 | 0.32 | 0.40 | 0.04 |
| **205802** | 0.04 | 0.00 | 0.00 | 0.00 | 0.67 | 0.00 | 0.00 | 0.00 | 0.08 | 0.21 | 0.57 | 0.01 | 0.00 | 0.68 |
| **205803** | 0.40 | 0.64 | 0.25 | 0.32 | 0.22 | 0.06 | 0.48 | 0.58 | 0.54 | 0.03 | 0.29 | 0.02 | 0.40 | 0.46 |
| **205804** | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 | 0.26 | 0.00 | 0.00 | 0.32 | 0.18 | 0.31 | 0.00 | 0.00 | 0.34 |
| **205805** | 0.36 | 0.00 | 0.66 | 0.00 | 0.22 | 0.00 | 0.62 | 0.00 | 0.60 | 0.32 | 0.51 | 0.35 | 0.24 | 0.54 |

| ID | 2121 | 2211 | 2221 | 3111 | 3121 | 3211 | 3221 | 1111 | 1131 | 1132 | 1133 | 1231 | 1232 | 1233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***210101*** | 0.45 | 0.02 | 0.35 | 0.40 | 0.93 | 0.41 | 0.16 | 0.53 | 0.46 | 0.08 | 0.03 | 0.85 | 0.87 | 0.33 |
| ***210102*** | 0.19 | 0.65 | 0.43 | 0.24 | 0.06 | 0.76 | 0.30 | 0.23 | 0.18 | 0.91 | 0.38 | 0.00 | 0.48 | 0.82 |
| ***210103*** | 0.59 | 0.01 | 0.06 | 0.09 | 0.21 | 0.15 | 0.15 | 0.74 | 0.76 | 0.09 | 0.01 | 0.90 | 0.42 | 0.49 |
| ***210104*** | 0.18 | 0.73 | 0.15 | 0.09 | 0.55 | 0.32 | 0.77 | 0.71 | 0.00 | 0.03 | 0.12 | 0.02 | 0.60 | 0.74 |
| ***210105*** | 0.08 | 0.48 | 0.23 | 0.62 | 0.15 | 0.22 | 0.12 | 0.10 | 0.58 | 0.71 | 0.64 | 0.19 | 0.70 | 0.00 |
| ***211201*** | 0.18 | 0.03 | 0.27 | 0.63 | 0.35 | 0.93 | 0.29 | 0.90 | 0.03 | 0.16 | 0.51 | 0.19 | 0.34 | 0.04 |
| ***211202*** | 0.20 | 0.33 | 0.74 | 0.21 | 0.83 | 0.20 | 0.36 | 0.33 | 0.10 | 0.29 | 0.91 | 0.00 | 0.81 | 0.03 |
| ***211203*** | 0.46 | 0.06 | 0.46 | 0.83 | 0.11 | 0.95 | 0.65 | 0.65 | 0.15 | 0.73 | 0.52 | 0.27 | 0.65 | 0.25 |
| ***211204*** | 0.51 | 0.16 | 0.00 | 0.72 | 0.10 | 0.35 | 0.25 | 0.48 | 0.50 | 0.20 | 0.57 | 0.52 | 0.16 | 0.02 |
| ***211205*** | 0.40 | 0.28 | 0.87 | 0.41 | 0.34 | 0.05 | 0.02 | 0.38 | 0.32 | 0.35 | 0.18 | 0.26 | 0.73 | 0.00 |
| ***214901*** | 0.15 | 0.21 | 0.04 | 0.06 | 0.06 | 0.61 | 0.09 | 0.45 | 0.32 | 0.15 | 0.09 | 0.78 | 0.78 | 0.85 |
| ***214902*** | 0.69 | 0.71 | 0.28 | 0.17 | 0.19 | 0.66 | 0.20 | 0.54 | 0.06 | 0.08 | 0.00 | 0.10 | 0.09 | 0.54 |
| ***214903*** | 0.14 | 0.25 | 0.08 | 0.49 | 0.09 | 0.43 | 0.04 | 0.37 | 0.48 | 0.02 | 0.12 | 0.49 | 0.26 | 0.36 |
| ***214904*** | 0.06 | 0.27 | 0.01 | 0.30 | 0.03 | 0.87 | 0.56 | 0.09 | 0.03 | 0.00 | 0.00 | 0.32 | 0.20 | 0.00 |
| ***214905*** | 0.36 | 0.80 | 0.16 | 0.16 | 0.42 | 0.34 | 0.22 | 0.47 | 0.84 | 0.32 | 0.77 | 0.99 | 0.29 | 0.00 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***010101*** | 0.91 | 0.33 | 0.45 | 0.17 | 0.32 | 0.62 | 0.05 | 0.81 | 0.12 | 0.04 | 0.47 | 0.58 |
| ***010102*** | 0.60 | 0.04 | 0.58 | 0.82 | 0.57 | 0.59 | 0.06 | 0.23 | 0.16 | 0.22 | 0.95 | 0.21 |
| ***010103*** | 0.92 | 0.16 | 0.67 | 0.36 | 0.53 | 0.24 | 0.00 | 0.24 | 0.73 | 0.15 | 0.62 | 0.03 |
| ***010104*** | 0.25 | 0.66 | 0.77 | 0.13 | 0.14 | 0.67 | 0.20 | 0.71 | 0.92 | 0.08 | 0.86 | 0.09 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 010105 | 0.06 | 0.50 | 0.11 | 0.15 | 0.88 | 0.55 | 0.12 | 0.96 | 0.60 | 0.30 | 0.23 | 0.50 |
| 010201 | 0.79 | 0.51 | 0.59 | 0.03 | 0.51 | 0.36 | 0.80 | 0.63 | 0.01 | 0.29 | 0.03 | 0.98 |
| 010202 | 0.07 | 0.26 | 0.37 | 0.00 | 0.25 | 0.02 | 0.00 | 0.02 | 0.35 | 0.05 | 0.00 | 0.52 |
| 010203 | 0.41 | 0.76 | 0.68 | 0.22 | 0.81 | 0.36 | 0.71 | 0.75 | 0.01 | 0.75 | 0.17 | 0.77 |
| 010204 | 0.07 | 0.01 | 0.11 | 0.12 | 0.02 | 0.00 | 0.46 | 0.26 | 0.28 | 0.01 | 0.06 | 0.15 |
| 010205 | 0.01 | 0.94 | 0.35 | 0.24 | 0.84 | 0.22 | 0.01 | 0.04 | 0.33 | 0.56 | 0.42 | 0.02 |
| 010301 | 0.41 | 0.07 | 0.43 | 0.45 | 0.68 | 0.78 | 0.27 | 0.08 | 0.87 | 0.07 | 0.37 | 0.55 |
| 010302 | 0.27 | 0.10 | 0.03 | 0.15 | 0.29 | 0.07 | 0.16 | 0.58 | 0.14 | 0.08 | 0.17 | 0.45 |
| 010303 | 0.55 | 0.24 | 0.23 | 0.80 | 0.86 | 0.70 | 0.79 | 0.08 | 0.58 | 0.31 | 0.13 | 0.18 |
| 010304 | 0.78 | 0.23 | 0.41 | 0.85 | 0.65 | 0.13 | 0.85 | 0.18 | 0.17 | 0.03 | 0.16 | 0.01 |
| 010305 | 0.21 | 0.40 | 0.22 | 0.09 | 0.77 | 0.68 | 0.04 | 0.58 | 0.56 | 0.81 | 0.41 | 0.19 |
| 010401 | 0.59 | 0.50 | 0.05 | 0.06 | 0.06 | 0.09 | 0.17 | 0.31 | 0.81 | 0.30 | 0.65 | 0.20 |
| 010402 | 0.57 | 0.03 | 0.00 | 0.39 | 0.00 | 0.00 | 0.12 | 0.54 | 0.00 | 0.53 | 0.13 | 0.00 |
| 010403 | 0.85 | 0.18 | 0.00 | 0.06 | 0.76 | 0.02 | 0.65 | 0.32 | 0.65 | 0.43 | 0.22 | 0.74 |
| 010404 | 0.04 | 0.00 | 0.30 | 0.78 | 0.31 | 0.16 | 0.15 | 0.81 | 0.50 | 0.06 | 0.15 | 0.00 |
| 010405 | 0.69 | 0.25 | 0.02 | 0.07 | 0.20 | 0.61 | 0.07 | 0.32 | 0.06 | 0.65 | 0.04 | 0.23 |
| 010501 | 0.10 | 0.34 | 0.54 | 0.30 | 0.47 | 0.65 | 0.57 | 0.21 | 0.91 | 0.30 | 0.44 | 0.41 |
| 010502 | 0.71 | 0.67 | 0.80 | 0.97 | 0.78 | 0.66 | 0.47 | 0.12 | 0.43 | 0.69 | 0.34 | 0.17 |
| 010503 | 0.21 | 0.61 | 0.16 | 0.64 | 0.60 | 0.55 | 0.80 | 0.65 | 0.61 | 0.28 | 0.16 | 0.62 |
| 010504 | 0.75 | 0.79 | 0.12 | 0.36 | 0.29 | 0.44 | 0.62 | 0.23 | 0.57 | 0.14 | 0.10 | 0.51 |
| 010505 | 0.78 | 0.24 | 0.01 | 0.50 | 0.36 | 0.42 | 0.45 | 0.95 | 0.21 | 0.00 | 0.83 | 0.07 |
| 010601 | 0.42 | 0.62 | 0.39 | 0.63 | 0.36 | 0.40 | 0.44 | 0.82 | 0.64 | 0.81 | 0.57 | 0.13 |
| 010602 | 0.33 | 0.46 | 0.36 | 0.10 | 0.35 | 0.61 | 0.45 | 0.09 | 0.53 | 0.53 | 0.83 | 0.14 |
| 010603 | 0.06 | 0.17 | 0.96 | 0.25 | 0.28 | 0.61 | 0.69 | 0.88 | 0.72 | 0.73 | 0.73 | 0.67 |
| 010604 | 0.20 | 0.95 | 0.69 | 0.36 | 0.10 | 0.60 | 0.28 | 0.35 | 0.39 | 0.05 | 0.67 | 0.14 |
| 010605 | 0.35 | 0.29 | 0.78 | 0.87 | 0.06 | 0.27 | 0.16 | 0.18 | 0.60 | 0.24 | 0.05 | 0.08 |
| 010701 | 0.70 | 0.32 | 0.03 | 0.94 | 0.62 | 0.41 | 0.00 | 0.62 | 0.02 | 0.63 | 0.48 | 0.40 |
| 010702 | 0.91 | 0.36 | 0.53 | 0.88 | 0.56 | 0.05 | 0.08 | 0.35 | 0.57 | 0.40 | 0.19 | 0.10 |
| 010703 | 0.33 | 0.33 | 0.52 | 0.24 | 0.49 | 0.48 | 0.54 | 0.90 | 0.41 | 0.69 | 0.41 | 0.91 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 010704 | 0.59 | 0.04 | 0.64 | 0.55 | 0.17 | 0.48 | 0.66 | 0.89 | 0.85 | 0.51 | 0.14 | 0.13 |
| 010705 | 0.99 | 0.64 | 0.15 | 0.31 | 0.89 | 0.14 | 0.75 | 0.49 | 0.81 | 0.53 | 0.49 | 0.42 |
| 010801 | 0.61 | 0.55 | 0.67 | 0.35 | 0.74 | 0.14 | 0.07 | 0.35 | 0.05 | 0.79 | 0.11 | 0.19 |
| 010802 | 0.93 | 0.45 | 0.76 | 0.23 | 0.26 | 0.96 | 0.28 | 0.10 | 0.15 | 0.42 | 0.38 | 0.20 |
| 010803 | 0.53 | 0.50 | 0.63 | 0.83 | 0.77 | 0.85 | 0.70 | 0.26 | 0.38 | 0.49 | 0.25 | 0.64 |
| 010804 | 0.29 | 0.29 | 0.57 | 0.20 | 0.03 | 0.24 | 0.84 | 0.56 | 0.65 | 0.31 | 0.74 | 0.50 |
| 010805 | 0.48 | 0.27 | 0.14 | 0.14 | 0.43 | 0.80 | 0.78 | 0.94 | 0.96 | 0.55 | 0.32 | 0.60 |
| 010901 | 0.56 | 0.09 | 0.21 | 0.17 | 0.68 | 0.43 | 0.47 | 0.78 | 0.34 | 0.81 | 0.55 | 0.33 |
| 010902 | 0.03 | 0.91 | 0.11 | 0.73 | 0.34 | 0.38 | 0.10 | 0.12 | 0.54 | 0.88 | 0.06 | 0.31 |
| 010903 | 0.24 | 0.22 | 0.02 | 0.89 | 0.06 | 0.05 | 0.33 | 0.63 | 0.43 | 0.29 | 0.18 | 0.03 |
| 010904 | 0.07 | 0.19 | 0.65 | 0.55 | 0.13 | 0.86 | 0.16 | 0.59 | 0.69 | 0.83 | 0.34 | 0.66 |
| 010905 | 0.66 | 0.17 | 0.24 | 0.67 | 0.09 | 0.82 | 0.67 | 0.93 | 0.37 | 0.31 | 0.61 | 0.43 |
| 011001 | 0.49 | 0.27 | 0.19 | 0.24 | 0.21 | 0.84 | 0.78 | 0.62 | 0.52 | 0.10 | 0.68 | 0.40 |
| 011002 | 0.56 | 0.01 | 0.07 | 0.47 | 0.63 | 0.13 | 0.64 | 0.03 | 0.32 | 0.20 | 0.13 | 0.03 |
| 011003 | 0.48 | 0.84 | 0.63 | 0.68 | 0.76 | 0.62 | 0.25 | 0.91 | 0.95 | 0.55 | 0.47 | 0.56 |
| 011004 | 0.38 | 0.06 | 0.87 | 0.68 | 0.29 | 0.59 | 0.54 | 0.79 | 0.86 | 0.55 | 0.14 | 0.22 |
| 011005 | 0.02 | 0.07 | 0.00 | 0.38 | 0.75 | 0.03 | 0.04 | 0.05 | 0.09 | 0.36 | 0.40 | 0.11 |
| 011101 | 0.39 | 0.53 | 0.78 | 0.73 | 0.55 | 0.48 | 0.11 | 0.76 | 0.20 | 0.14 | 0.68 | 0.49 |
| 011102 | 0.93 | 0.45 | 0.76 | 0.23 | 0.26 | 0.96 | 0.28 | 0.10 | 0.15 | 0.42 | 0.38 | 0.20 |
| 011103 | 0.70 | 0.45 | 0.85 | 0.27 | 0.44 | 0.30 | 0.20 | 0.79 | 0.72 | 0.58 | 0.21 | 0.40 |
| 011104 | 0.22 | 0.19 | 0.17 | 0.47 | 0.55 | 0.20 | 0.03 | 0.64 | 0.32 | 0.78 | 0.52 | 0.01 |
| 011105 | 0.22 | 0.62 | 0.45 | 0.09 | 0.34 | 0.02 | 0.54 | 0.43 | 0.46 | 0.55 | 0.05 | 0.00 |
| 011201 | 0.38 | 0.57 | 0.52 | 0.38 | 0.94 | 0.73 | 0.03 | 0.05 | 0.63 | 0.14 | 0.45 | 0.14 |
| 011202 | 0.69 | 0.02 | 0.01 | 0.36 | 0.72 | 0.43 | 0.41 | 0.49 | 0.24 | 0.41 | 0.55 | 0.11 |
| 011203 | 0.05 | 0.10 | 0.80 | 0.67 | 0.64 | 0.20 | 0.38 | 0.12 | 0.93 | 0.67 | 0.42 | 0.15 |
| 011204 | 0.21 | 0.31 | 0.19 | 0.14 | 0.19 | 0.75 | 0.63 | 0.40 | 0.19 | 0.81 | 0.53 | 0.29 |
| 011205 | 0.12 | 0.05 | 0.29 | 0.01 | 0.10 | 0.47 | 0.70 | 0.14 | 0.09 | 0.38 | 0.60 | 0.00 |
| 021301 | 0.02 | 0.54 | 0.23 | 0.06 | 0.08 | 0.76 | 0.06 | 0.00 | 0.07 | 0.26 | 0.46 | 0.73 |
| 021303 | 0.00 | 0.74 | 0.43 | 0.01 | 0.05 | 0.25 | 0.02 | 0.00 | 0.13 | 0.18 | 0.28 | 0.24 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***021304*** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| ***021305*** | n/d | n/d | 0.00 | n/d | n/d | 0.00 | n/d | n/d | n/d | n/d | n/d | n/d |
| ***021401*** | 0.02 | 0.16 | 0.80 | 0.28 | 0.19 | 0.67 | 0.42 | 0.14 | 0.09 | 0.30 | 0.43 | 0.18 |
| ***021403*** | 0.01 | 0.05 | 0.08 | 0.30 | 0.17 | 0.67 | 0.34 | 0.35 | 0.01 | 0.41 | 0.17 | 0.08 |
| ***021404*** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| ***021405*** | n/d | n/d | 0.00 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| ***021501*** | 0.23 | 0.04 | 0.11 | 0.87 | 0.41 | 0.45 | 0.43 | 0.58 | 0.73 | 0.31 | 0.86 | 0.76 |
| ***021502*** | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| ***021503*** | 0.77 | 0.20 | 0.06 | 0.05 | 0.49 | 0.24 | 0.04 | 0.48 | 0.39 | 0.95 | 0.16 | 0.45 |
| ***021504*** | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 |
| ***021505*** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| ***030101*** | 0.56 | 0.60 | 0.07 | 0.48 | 0.55 | 0.06 | 0.29 | 0.34 | 0.21 | 0.15 | 0.79 | 0.01 |
| ***030102*** | 0.75 | 0.89 | 0.16 | 0.21 | 0.05 | 0.12 | 0.39 | 0.09 | 0.40 | 0.84 | 0.46 | 0.07 |
| ***030103*** | 0.90 | 0.35 | 0.61 | 0.23 | 0.51 | 0.85 | 0.98 | 0.54 | 0.27 | 0.80 | 0.74 | 0.23 |
| ***030104*** | 0.67 | 0.34 | 0.48 | 0.20 | 0.66 | 0.12 | 0.61 | 0.44 | 0.65 | 0.54 | 0.41 | 0.16 |
| ***030105*** | 0.21 | 0.38 | 0.30 | 0.55 | 0.89 | 0.27 | 0.05 | 0.08 | 0.07 | 0.18 | 0.01 | 0.21 |
| ***030106*** | 0.54 | 0.56 | 0.32 | 0.18 | 0.79 | 0.79 | 0.54 | 0.27 | 0.26 | 0.82 | 0.71 | 0.00 |
| ***030107*** | 0.41 | 0.54 | 0.32 | 0.81 | 0.46 | 0.17 | 0.61 | 0.48 | 0.77 | 0.92 | 0.86 | 0.43 |
| ***031201*** | 0.40 | 0.24 | 0.79 | 0.55 | 0.22 | 0.32 | 0.04 | 0.37 | 0.91 | 0.14 | 0.92 | 0.12 |
| ***031202*** | 0.11 | 0.00 | 0.00 | 0.75 | 0.20 | 0.00 | 0.64 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***031203*** | 0.29 | 0.11 | 0.13 | 0.88 | 0.58 | 0.28 | 0.03 | 0.94 | 0.29 | 0.11 | 0.01 | 0.35 |
| ***031204*** | 0.14 | 0.02 | 0.12 | 0.15 | 0.16 | 0.03 | 0.05 | 0.06 | 0.62 | 0.02 | 0.00 | 0.15 |
| ***031205*** | 0.29 | 0.11 | 0.28 | 0.64 | 0.08 | 0.86 | 0.22 | 0.33 | 0.03 | 0.15 | 0.88 | 0.00 |
| ***031206*** | 0.70 | 0.48 | 0.18 | 0.79 | 0.95 | 0.88 | 0.17 | 0.95 | 0.22 | 0.49 | 0.85 | 0.07 |
| ***031207*** | 0.45 | 0.36 | 0.73 | 0.45 | 0.21 | 0.34 | 0.53 | 0.79 | 0.18 | 0.52 | 0.09 | 0.00 |
| ***040101*** | 0.14 | 0.14 | 0.01 | 0.41 | 0.61 | 0.14 | 0.71 | 0.47 | 0.04 | 0.79 | 0.64 | 0.02 |
| ***040102*** | 0.51 | 0.12 | 0.29 | 0.21 | 0.03 | 0.19 | 0.49 | 0.24 | 0.41 | 0.53 | 0.95 | 0.02 |
| ***040103*** | 0.64 | 0.44 | 0.17 | 0.41 | 0.57 | 0.78 | 0.25 | 0.70 | 0.13 | 0.68 | 0.42 | 0.08 |
| ***040104*** | 0.16 | 0.76 | 0.29 | 0.29 | 0.54 | 0.52 | 0.58 | 0.54 | 0.68 | 0.50 | 0.03 | 0.42 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 040105 | 0.26 | 0.13 | 0.30 | 0.08 | 0.57 | 0.35 | 0.28 | 0.52 | 0.02 | 0.51 | 0.05 | 0.01 |
| 040106 | 0.33 | 0.68 | 0.80 | 0.36 | 0.39 | 0.54 | 0.08 | 0.05 | 0.16 | 0.11 | 0.52 | 0.08 |
| 040107 | 0.90 | 0.89 | 0.07 | 0.80 | 0.82 | 0.21 | 0.31 | 0.09 | 0.80 | 0.64 | 0.71 | 0.27 |
| 041201 | 0.94 | 0.32 | 0.16 | 0.24 | 0.21 | 0.33 | 0.70 | 0.13 | 0.60 | 0.54 | 0.16 | 0.03 |
| 041202 | 0.77 | 0.09 | 0.00 | 0.41 | 0.50 | 0.02 | 0.85 | 0.01 | 0.04 | 0.00 | 0.15 | 0.06 |
| 041203 | 0.46 | 0.29 | 0.23 | 0.02 | 0.23 | 0.59 | 0.92 | 0.20 | 0.44 | 0.00 | 0.04 | 0.14 |
| 041204 | 0.23 | 0.00 | 0.56 | 0.02 | 0.40 | 0.34 | 0.10 | 0.00 | 0.36 | 0.01 | 0.04 | 0.04 |
| 041205 | 0.38 | 0.00 | 0.25 | 0.04 | 0.17 | 0.79 | 0.58 | 0.59 | 0.16 | 0.45 | 0.96 | 0.02 |
| 041206 | 0.58 | 0.69 | 0.90 | 0.84 | 0.40 | 0.85 | 0.19 | 0.24 | 0.86 | 0.44 | 0.29 | 0.11 |
| 041207 | 0.35 | 0.62 | 0.18 | 0.28 | 0.40 | 0.70 | 0.54 | 0.21 | 0.02 | 0.51 | 0.10 | 0.45 |
| 051601 | 0.20 | 0.02 | 0.43 | 0.58 | 0.79 | 0.19 | 0.57 | 0.51 | 0.01 | 0.42 | 0.05 | 0.65 |
| 051602 | 0.74 | 0.30 | 0.00 | 0.49 | 0.11 | 0.28 | 0.25 | 0.22 | 0.00 | 0.04 | 0.68 | 0.00 |
| 051603 | 0.01 | 0.02 | 0.29 | 0.04 | 0.31 | 0.13 | 0.08 | 0.38 | 0.18 | 0.80 | 0.17 | 0.11 |
| 051604 | 0.38 | 0.00 | 0.00 | 0.01 | 0.62 | 0.00 | 0.29 | 0.00 | 0.00 | 0.01 | n/d | 0.00 |
| 051605 | 0.54 | 0.24 | 0.00 | 0.43 | 0.58 | 0.73 | 0.22 | 0.53 | 0.02 | 0.51 | 0.19 | 0.16 |
| 051701 | 0.22 | 0.02 | 0.00 | 0.55 | 0.03 | 0.01 | 0.41 | 0.03 | 0.27 | 0.75 | 0.00 | 0.05 |
| 051702 | 0.40 | 0.63 | n/d | 0.06 | 0.38 | 0.00 | 0.10 | 0.17 | 0.00 | 0.51 | 0.46 | n/d |
| 051703 | 0.76 | 0.08 | 0.00 | 0.57 | 0.27 | 0.44 | 0.38 | 0.20 | 0.34 | 0.43 | 0.19 | 0.14 |
| 051704 | 0.35 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.08 | n/d | 0.00 | 0.21 | n/d | 0.00 |
| 051705 | 0.72 | 0.47 | 0.01 | 0.01 | 0.00 | 0.05 | 0.19 | 0.21 | 0.00 | 0.61 | 0.06 | 0.00 |
| 061601 | 0.03 | 0.01 | 0.11 | 0.42 | 0.16 | 0.14 | 0.69 | 0.02 | 0.08 | 0.67 | 0.84 | 0.09 |
| 061701 | 0.16 | 0.71 | 0.00 | 0.07 | 0.10 | 0.00 | 0.13 | 0.88 | 0.06 | 0.30 | 0.19 | 0.00 |
| 071601 | 0.43 | 0.02 | 0.03 | 0.66 | 0.20 | 0.02 | 0.65 | 0.01 | 0.00 | 0.23 | 0.00 | 0.01 |
| 071701 | 0.98 | 0.77 | 0.05 | 0.55 | 0.23 | 0.03 | 0.41 | 0.59 | 0.02 | 0.57 | 0.00 | 0.00 |
| 081801 | 0.52 | 0.21 | 0.00 | 0.07 | 0.27 | 0.01 | 0.83 | 0.09 | 0.25 | 0.08 | 0.06 | 0.62 |
| 081802 | 0.22 | 0.31 | 0.30 | 0.01 | 0.02 | 0.18 | 0.67 | 0.06 | 0.47 | 0.48 | 0.06 | 0.69 |
| 081803 | 0.28 | 0.00 | 0.03 | 0.21 | 0.01 | 0.01 | 0.76 | 0.14 | 0.77 | 0.10 | 0.65 | 0.62 |
| 081804 | 0.00 | 0.15 | 0.59 | 0.04 | 0.02 | 0.31 | 0.04 | 0.06 | 0.16 | 0.00 | 0.00 | 0.57 |
| 081805 | 0.27 | 0.57 | 0.31 | 0.00 | 0.00 | 0.61 | 0.02 | 0.70 | 0.42 | 0.00 | 0.00 | 0.03 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 081901 | 0.26 | 0.62 | 0.03 | 0.75 | 0.64 | 0.71 | 0.44 | 0.76 | 0.08 | 0.78 | 0.06 | 0.19 |
| 081902 | 0.44 | 0.64 | 0.08 | n/d | 0.04 | 0.02 | 0.88 | 0.13 | 0.47 | n/d | 0.63 | 0.17 |
| 081903 | 0.55 | 0.47 | 0.86 | 0.01 | 0.57 | 0.24 | 0.14 | 0.85 | 0.92 | 0.49 | 0.01 | 0.22 |
| 081904 | 0.00 | 0.06 | 0.44 | n/d | n/d | 0.17 | 0.02 | 0.80 | 0.72 | n/d | n/d | 0.47 |
| 081905 | 0.33 | 0.21 | 0.28 | 0.00 | 0.02 | 0.05 | 0.00 | 0.31 | 0.81 | 0.00 | 0.00 | 0.50 |
| 082002 | 0.09 | 0.24 | 0.82 | n/d | 0.03 | 0.08 | 0.07 | 0.14 | 0.30 | n/d | n/d | 0.26 |
| 082003 | 0.83 | 0.02 | 0.93 | 0.06 | 0.37 | 0.78 | 0.34 | 0.23 | 0.80 | 0.30 | 0.01 | 0.12 |
| 082004 | 0.07 | 0.22 | 0.06 | n/d | n/d | 0.00 | 0.07 | 0.09 | 0.08 | n/d | n/d | 0.12 |
| 082005 | 0.00 | 0.01 | 0.19 | n/d | n/d | 0.03 | 0.00 | 0.00 | 0.16 | n/d | n/d | 0.05 |
| 082102 | 0.25 | 0.22 | 0.12 | n/d | n/d | 0.13 | 0.08 | 0.05 | 0.26 | n/d | n/d | 0.04 |
| 082103 | 0.64 | 0.19 | 0.23 | 0.00 | 0.56 | 0.21 | 0.20 | 0.71 | 0.12 | 0.24 | 0.23 | 0.29 |
| 082104 | n/d | 0.22 | 0.46 | n/d | n/d | 0.18 | n/d | n/d | 0.08 | n/d | n/d | n/d |
| 082105 | 0.00 | 0.00 | 0.04 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 | 0.00 |
| 082201 | 0.82 | 0.43 | 0.45 | 0.27 | 0.31 | 0.30 | 0.28 | 0.87 | 0.28 | 0.04 | 0.54 | 0.85 |
| 082202 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082203 | 0.28 | 0.29 | 0.08 | 0.44 | 0.29 | 0.02 | 0.81 | 0.79 | 0.10 | 0.15 | 0.44 | 0.26 |
| 082204 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 |
| 082205 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082302 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082303 | 0.51 | 0.61 | 0.05 | 0.19 | 0.35 | 0.08 | 0.12 | 0.45 | 0.81 | 0.05 | 0.27 | 0.88 |
| 082304 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082305 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082402 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082403 | 0.41 | 0.17 | 0.10 | 0.00 | 0.14 | 0.07 | 0.43 | 0.65 | 0.15 | 0.00 | 0.31 | 0.69 |
| 082404 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 |
| 082405 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d |
| 082501 | 0.82 | 0.43 | 0.45 | 0.27 | 0.31 | 0.30 | 0.28 | 0.87 | 0.15 | 0.04 | 0.37 | 0.85 |
| 082502 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082503 | 0.28 | 0.29 | 0.08 | 0.44 | 0.45 | 0.02 | 0.84 | 0.79 | 0.10 | 0.15 | 0.45 | 0.26 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 082504 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 |
| 082505 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082602 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082603 | 0.51 | 0.87 | 0.05 | 0.31 | 0.08 | 0.08 | 0.12 | 0.45 | 0.81 | 0.05 | 0.27 | 0.23 |
| 082604 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082605 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082702 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 082703 | 0.01 | 0.17 | 0.10 | 0.00 | 0.14 | 0.07 | 0.43 | 0.65 | 0.15 | 0.00 | 0.31 | 0.69 |
| 082704 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.00 |
| 082705 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | n/d |
| 082801 | 0.65 | 0.12 | 0.24 | 0.42 | 0.01 | 0.33 | 0.32 | 0.40 | 0.79 | 0.20 | 0.88 | 0.99 |
| 082802 | 0.00 | 0.33 | 0.05 | 0.00 | 0.21 | 0.08 | 0.22 | 0.02 | 0.13 | 0.00 | 0.03 | 0.55 |
| 082803 | 0.17 | 0.89 | 0.41 | 0.23 | 0.09 | 0.75 | 0.56 | 0.31 | 0.57 | 0.03 | 0.25 | 0.60 |
| 082804 | 0.02 | 0.02 | 0.12 | 0.01 | 0.29 | 0.00 | 0.18 | 0.45 | 0.06 | 0.00 | 0.07 | 0.54 |
| 082805 | 0.05 | 0.48 | 0.58 | 0.00 | 0.00 | 0.29 | 0.03 | 0.00 | 0.52 | 0.00 | 0.01 | 0.08 |
| 082901 | 0.06 | 0.57 | 0.90 | 0.94 | 0.16 | 0.16 | 0.58 | 0.65 | 0.68 | 0.16 | 0.53 | 0.43 |
| 082902 | 0.33 | 0.65 | 0.51 | 0.00 | 0.00 | 0.04 | 0.03 | 0.09 | 0.00 | n/d | n/d | 0.46 |
| 082903 | 0.27 | 0.48 | 0.57 | 0.03 | 0.36 | 0.69 | 0.54 | 0.10 | 0.31 | 0.24 | 0.46 | 0.11 |
| 082904 | 0.01 | 0.16 | 0.08 | n/d | n/d | 0.07 | 0.03 | 0.38 | 0.07 | n/d | n/d | 0.17 |
| 082905 | 0.00 | 0.00 | 0.33 | 0.00 | 0.00 | 0.12 | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 | 0.03 |
| 083002 | 0.02 | 0.06 | 0.25 | n/d | 0.00 | 0.02 | 0.01 | 0.00 | 0.64 | n/d | n/d | 0.00 |
| 083003 | 0.15 | 0.04 | 0.27 | 0.14 | 0.41 | 0.51 | 0.69 | 0.13 | 0.42 | 0.55 | 0.85 | 0.47 |
| 083004 | 0.00 | 0.00 | 0.35 | n/d | n/d | 0.00 | 0.01 | 0.05 | 0.45 | n/d | n/d | n/d |
| 083005 | n/d | 0.09 | 0.26 | n/d | n/d | 0.00 | n/d | 0.00 | 0.03 | n/d | n/d | n/d |
| 083102 | n/d | 0.01 | 0.27 | n/d | n/d | 0.00 | n/d | 0.00 | 0.01 | n/d | n/d | n/d |
| 083103 | 0.17 | 0.07 | 0.95 | 0.03 | 0.00 | 0.46 | 0.00 | 0.06 | 0.18 | 0.00 | 0.04 | 0.07 |
| 083104 | n/d | 0.02 | 0.00 | n/d | n/d | n/d | n/d | n/d | 0.03 | n/d | n/d | 0.01 |
| 083105 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.00 | 0.00 | 0.00 |
| 090101 | 0.48 | 0.82 | 0.53 | 0.05 | 0.03 | 0.90 | 0.71 | 0.56 | 0.70 | 0.96 | 0.38 | 0.13 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 090102 | 0.55 | 0.05 | 0.44 | 0.27 | 0.05 | 0.36 | 0.03 | 0.45 | 0.28 | 0.97 | 0.64 | 0.39 |
| 090103 | 0.67 | 0.18 | 0.55 | 0.72 | 0.21 | 0.57 | 0.63 | 0.03 | 0.45 | 0.83 | 0.20 | 0.28 |
| 090104 | 0.49 | 0.13 | 0.90 | 0.15 | 0.25 | 0.74 | 0.64 | 0.13 | 0.85 | 0.10 | 0.06 | 0.50 |
| 090105 | 0.21 | 0.22 | 0.37 | 0.21 | 0.09 | 0.62 | 0.47 | 0.84 | 0.10 | 0.66 | 0.94 | 0.78 |
| 091201 | 0.28 | 0.26 | 0.25 | 0.93 | 0.45 | 0.96 | 0.21 | 0.01 | 0.14 | 0.24 | 0.15 | 0.61 |
| 091202 | 0.62 | 0.07 | 0.00 | 0.30 | 0.89 | 0.13 | 0.19 | 0.12 | 0.02 | 0.00 | 0.66 | 0.06 |
| 091203 | 0.08 | 0.00 | 0.48 | 0.09 | 0.29 | 0.28 | 0.26 | 0.70 | 0.24 | 0.12 | 0.88 | 0.85 |
| 091204 | 0.35 | 0.00 | 0.48 | 0.01 | 0.01 | 0.08 | 0.02 | 0.01 | 0.32 | 0.02 | 0.01 | 0.02 |
| 091205 | 0.65 | 0.41 | 0.79 | 0.26 | 0.10 | 0.26 | 0.53 | 0.60 | 0.30 | 0.27 | 0.40 | 0.09 |
| 103201 | 0.62 | 0.30 | 0.56 | 0.17 | 0.12 | 0.44 | 0.12 | 0.02 | 0.70 | 0.11 | 0.06 | 0.69 |
| 103202 | 0.83 | 0.57 | 0.13 | 0.75 | 0.65 | 0.52 | 0.95 | 0.53 | 0.20 | 0.68 | 0.32 | 0.05 |
| 103203 | 0.88 | 0.65 | 0.01 | 0.27 | 0.70 | 0.21 | 0.90 | 0.56 | 0.56 | 0.11 | 0.12 | 0.55 |
| 103204 | 0.74 | 0.26 | 0.75 | 0.59 | 0.48 | 0.16 | 0.73 | 0.52 | 0.97 | 0.57 | 0.24 | 0.12 |
| 103205 | 0.65 | 0.15 | 0.67 | 0.68 | 0.80 | 0.93 | 0.00 | 0.21 | 0.37 | 0.68 | 0.33 | 0.23 |
| 103301 | 0.12 | 0.57 | 0.75 | 0.15 | 0.23 | 0.35 | 0.81 | 0.41 | 0.28 | 0.73 | 0.50 | 0.96 |
| 103302 | 0.45 | 0.84 | 0.28 | 0.09 | 0.38 | 0.38 | 0.58 | 0.45 | 0.41 | 0.22 | 0.40 | 0.70 |
| 103303 | 0.64 | 0.58 | 0.44 | 0.20 | 0.39 | 0.52 | 0.33 | 0.72 | 0.26 | 0.62 | 0.53 | 0.96 |
| 103304 | 0.58 | 0.65 | 0.83 | 0.04 | 0.77 | 0.90 | 0.40 | 0.28 | 0.61 | 0.86 | 0.53 | 0.90 |
| 103305 | 0.80 | 0.37 | 0.73 | 0.02 | 0.10 | 0.54 | 0.25 | 0.40 | 0.08 | 0.02 | 0.70 | 0.91 |
| 110101 | 0.13 | 0.81 | 0.13 | 0.16 | 0.96 | 0.44 | 0.26 | 0.61 | 0.12 | 0.74 | 0.02 | 0.00 |
| 110102 | 0.14 | 0.15 | 0.22 | 0.26 | 0.36 | 0.46 | 0.18 | 0.50 | 0.00 | 0.53 | 0.04 | 0.02 |
| 110103 | 0.25 | 0.50 | 0.75 | 0.77 | 0.17 | 0.76 | 0.12 | 0.75 | 0.68 | 0.92 | 0.57 | 0.20 |
| 110104 | 0.83 | 0.06 | 0.05 | 0.01 | 0.24 | 0.30 | 0.09 | 0.20 | 0.30 | 0.23 | 0.32 | 0.01 |
| 110105 | 0.56 | 0.23 | 0.15 | 0.85 | 0.62 | 0.33 | 0.14 | 0.48 | 0.09 | 0.38 | 0.03 | 0.37 |
| 111201 | 0.65 | 0.75 | 0.79 | 0.56 | 0.13 | 0.25 | 0.72 | 0.66 | 0.66 | 0.08 | 0.07 | 0.05 |
| 111202 | 0.01 | 0.02 | 0.01 | 0.39 | 0.46 | 0.08 | 0.04 | 0.00 | 0.00 | 0.11 | 0.01 | 0.00 |
| 111203 | 0.48 | 0.20 | 0.12 | 0.30 | 0.86 | 0.08 | 0.61 | 0.79 | 0.89 | 0.42 | 0.03 | 0.56 |
| 111204 | 0.02 | 0.05 | 0.23 | 0.08 | 0.56 | 0.01 | 0.12 | 0.05 | 0.66 | 0.01 | 0.00 | 0.47 |
| 111205 | 0.00 | 0.01 | 0.12 | 0.63 | 0.25 | 0.23 | 0.02 | 0.53 | 0.02 | 0.08 | 0.33 | 0.01 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 113401 | 0.67 | 0.19 | 0.54 | 0.01 | 0.10 | 0.58 | 0.05 | 0.35 | 0.19 | 0.85 | 0.07 | 0.17 |
| 113402 | 0.52 | 0.97 | 0.44 | 0.62 | 0.66 | 0.00 | 0.42 | 0.21 | 0.09 | 0.01 | 0.13 | 0.68 |
| 113403 | 0.95 | 0.36 | 0.95 | 0.64 | 0.17 | 0.29 | 0.49 | 0.12 | 0.34 | 0.66 | 0.83 | 0.05 |
| 113404 | 0.31 | 0.53 | 0.07 | 0.83 | 0.22 | 0.58 | 0.47 | 0.78 | 0.02 | 0.12 | 0.61 | 0.39 |
| 113405 | 0.33 | 0.09 | 0.01 | 0.94 | 0.16 | 0.69 | 0.46 | 0.13 | 0.22 | 0.49 | 0.68 | 0.00 |
| 120101 | 0.85 | 0.29 | 0.18 | 0.65 | 0.06 | 0.54 | 0.85 | 0.43 | 0.08 | 0.17 | 0.15 | 0.36 |
| 120102 | 0.29 | 0.05 | 0.13 | 0.01 | 0.70 | 0.56 | 0.60 | 0.01 | 0.02 | 0.10 | 0.73 | 0.02 |
| 120103 | 0.10 | 0.03 | 0.57 | 0.26 | 0.10 | 0.12 | 0.23 | 0.58 | 0.65 | 0.03 | 0.12 | 0.15 |
| 120104 | 0.26 | 0.12 | 0.22 | 0.85 | 0.48 | 0.67 | 0.67 | 0.11 | 0.08 | 0.37 | 0.11 | 0.01 |
| 120105 | 0.43 | 0.02 | 0.14 | 0.85 | 0.10 | 0.68 | 0.36 | 0.62 | 0.58 | 0.30 | 0.41 | 0.10 |
| 121201 | 0.16 | 0.18 | 0.17 | 0.39 | 0.01 | 0.78 | 0.51 | 0.46 | 0.59 | 0.17 | 0.10 | 0.01 |
| 121202 | 0.00 | 0.09 | 0.00 | 0.07 | 0.05 | 0.39 | 0.68 | 0.00 | 0.00 | 0.07 | 0.03 | 0.00 |
| 121203 | 0.04 | 0.46 | 0.09 | 0.30 | 0.01 | 0.34 | 0.56 | 0.39 | 0.94 | 0.15 | 0.02 | 0.24 |
| 121204 | 0.00 | 0.00 | 0.13 | 0.09 | 0.44 | 0.01 | 0.12 | 0.03 | 0.32 | 0.00 | 0.00 | 0.09 |
| 121205 | 0.09 | 0.07 | 0.31 | 0.45 | 0.02 | 0.93 | 0.00 | 0.07 | 0.25 | 0.28 | 0.43 | 0.00 |
| 123401 | 0.10 | 0.06 | 0.48 | 0.27 | 0.11 | 0.43 | 0.49 | 0.05 | 0.57 | 0.12 | 0.65 | 0.07 |
| 123402 | 0.00 | 0.00 | 0.34 | 0.00 | 0.49 | 0.03 | 0.00 | 0.01 | 0.01 | 0.00 | 0.07 | 0.46 |
| 123403 | 0.45 | 0.14 | 0.17 | 0.00 | 0.62 | 0.80 | 0.44 | 0.32 | 0.08 | 0.20 | 0.48 | 0.72 |
| 123404 | 0.13 | 0.88 | 0.34 | 0.05 | 0.41 | 0.56 | 0.82 | 0.48 | 0.16 | 0.30 | 0.09 | 0.25 |
| 123405 | 0.02 | 0.06 | 0.36 | 0.29 | 0.21 | 0.37 | 0.00 | 0.00 | 0.17 | 0.40 | 0.39 | 0.00 |
| 130101 | 0.21 | 0.03 | 0.61 | 0.48 | 0.05 | 0.59 | 0.69 | 0.59 | 0.00 | 0.41 | 0.69 | 0.88 |
| 130102 | 0.64 | 0.04 | 0.26 | 0.48 | 0.32 | 0.10 | 0.23 | 0.22 | 0.01 | 0.16 | 0.01 | 0.05 |
| 130103 | 0.41 | 0.40 | 0.19 | 0.46 | 0.96 | 0.31 | 0.17 | 0.32 | 0.00 | 0.67 | 0.29 | 0.90 |
| 130104 | 0.50 | 0.47 | 0.35 | 0.07 | 0.74 | 0.52 | 0.13 | 0.02 | 0.71 | 0.31 | 0.05 | 0.39 |
| 130105 | 0.07 | 0.67 | 0.02 | 0.17 | 0.62 | 0.64 | 0.28 | 0.61 | 0.06 | 0.06 | 0.72 | 0.29 |
| 131201 | 0.46 | 0.81 | 0.00 | 0.49 | 0.10 | 0.01 | 0.74 | 0.13 | 0.03 | 0.10 | 0.21 | 0.06 |
| 131202 | 0.21 | 0.05 | 0.18 | 0.52 | 0.03 | 0.38 | 0.68 | 0.02 | 0.16 | 0.73 | 0.02 | 0.97 |
| 131203 | 0.28 | 0.55 | 0.00 | 0.14 | 0.23 | 0.02 | 0.47 | 0.10 | 0.09 | 0.28 | 0.19 | 0.17 |
| 131204 | 0.04 | 0.22 | 0.00 | 0.03 | 0.66 | 0.17 | 0.11 | 0.44 | 0.09 | 0.06 | 0.02 | 0.26 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 131205 | 0.29 | 0.04 | 0.00 | 0.91 | 0.05 | 0.01 | 0.64 | 0.44 | 0.78 | 0.67 | 0.28 | 0.06 |
| 143501 | 0.08 | 0.96 | 0.25 | 0.16 | 0.58 | 0.34 | 0.53 | 0.91 | 0.39 | 0.76 | 0.07 | 0.95 |
| 153501 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| 163601 | 0.50 | 0.09 | 0.20 | 0.13 | 0.16 | 0.46 | 0.51 | 0.74 | 0.27 | 0.25 | 0.74 | 0.49 |
| 163602 | 0.23 | 0.10 | 0.85 | 0.59 | 0.18 | 0.31 | 0.44 | 0.05 | 0.36 | 0.13 | 0.58 | 0.35 |
| 163603 | 0.15 | 0.09 | 0.77 | 0.39 | 0.18 | 0.10 | 0.97 | 0.12 | 0.11 | 0.54 | 0.09 | 0.70 |
| 163604 | 0.20 | 0.01 | 0.51 | 0.75 | 0.94 | 0.07 | 0.42 | 0.56 | 0.68 | 0.03 | 0.31 | 0.27 |
| 163605 | 0.12 | 0.43 | 0.54 | 0.08 | 0.19 | 0.49 | 0.82 | 0.79 | 0.35 | 0.07 | 0.29 | 0.23 |
| 163701 | 0.67 | 0.53 | 0.06 | 0.34 | 0.74 | 0.33 | 0.33 | 0.73 | 0.01 | 0.66 | 0.72 | 0.01 |
| 163702 | 0.90 | 0.15 | 0.09 | 0.24 | 0.56 | 0.17 | 0.51 | 0.13 | 0.11 | 0.25 | 0.25 | 0.89 |
| 163703 | 0.33 | 0.98 | 0.06 | 0.56 | 0.95 | 0.60 | 0.12 | 0.75 | 0.06 | 0.88 | 0.46 | 0.01 |
| 163704 | 0.28 | 0.14 | 0.05 | 0.35 | 0.51 | 0.95 | 0.88 | 0.06 | 0.56 | 0.21 | 0.38 | 0.58 |
| 163705 | 0.22 | 0.05 | 0.00 | 0.77 | 0.03 | 0.03 | 0.17 | 0.19 | 0.05 | 0.12 | 0.61 | 0.04 |
| 163801 | 0.13 | 0.27 | 0.19 | 0.93 | 0.50 | 0.23 | 0.27 | 0.05 | 0.02 | 0.15 | 0.12 | 0.39 |
| 163802 | 0.96 | 0.11 | 0.08 | 0.04 | 0.45 | 0.23 | 0.07 | 0.36 | 0.04 | 0.02 | 0.11 | 0.04 |
| 163803 | 0.19 | 0.65 | 0.07 | 0.92 | 0.30 | 0.42 | 0.55 | 0.24 | 0.07 | 0.40 | 0.14 | 0.10 |
| 163804 | 0.18 | 0.04 | 0.06 | n/d | 0.01 | 0.03 | 0.55 | 0.46 | 0.46 | 0.00 | 0.01 | 0.09 |
| 163805 | 0.33 | 0.00 | 0.18 | 0.06 | 0.10 | 0.27 | 0.01 | 0.16 | 0.17 | 0.00 | 0.10 | 0.06 |
| 163901 | 0.01 | 0.03 | 0.51 | 0.27 | 0.82 | 0.01 | 0.00 | 0.45 | 0.38 | 0.55 | 0.04 | 0.00 |
| 163902 | 0.03 | 0.03 | 0.43 | 0.00 | 0.03 | 0.34 | 0.73 | 0.07 | 0.07 | 0.02 | 0.10 | 0.46 |
| 163903 | 0.01 | 0.06 | 0.45 | 0.15 | 0.80 | 0.01 | 0.00 | 0.54 | 0.39 | 0.43 | 0.05 | 0.00 |
| 163904 | 0.03 | 0.06 | 0.00 | 0.00 | 0.01 | 0.00 | 0.66 | 0.18 | 0.00 | 0.00 | 0.01 | 0.06 |
| 163905 | 0.16 | 0.12 | 0.00 | 0.08 | 0.20 | 0.00 | 0.34 | 0.11 | 0.00 | 0.02 | 0.19 | 0.03 |
| 171601 | 0.49 | 0.01 | 0.39 | 0.19 | 0.73 | 0.01 | 0.46 | 0.02 | 0.01 | 0.11 | 0.02 | 0.04 |
| 171602 | 0.70 | 0.92 | 0.00 | 0.63 | 0.31 | 0.04 | 0.67 | 0.21 | 0.00 | 0.49 | 0.63 | n/d |
| 171603 | 0.04 | 0.00 | 0.26 | 0.18 | 0.49 | 0.38 | 0.08 | 0.06 | 0.01 | 0.38 | 0.00 | 0.02 |
| 171604 | 0.31 | 0.00 | 0.00 | 0.05 | 0.15 | 0.00 | 0.03 | n/d | 0.00 | 0.00 | n/d | 0.00 |
| 171605 | 0.00 | 0.10 | 0.02 | 0.00 | 0.03 | 0.06 | 0.00 | 0.42 | 0.04 | 0.19 | 0.08 | 0.02 |
| 171701 | 0.15 | 0.00 | 0.10 | 0.03 | 0.38 | 0.05 | 0.35 | 0.00 | 0.00 | 0.31 | n/d | 0.23 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 171702 | 0.18 | 0.10 | 0.00 | 0.33 | 0.18 | 0.03 | 0.68 | 0.07 | 0.00 | 0.46 | 0.61 | n/d |
| 171703 | 0.09 | 0.00 | 0.05 | 0.10 | 0.10 | 0.15 | 0.68 | 0.01 | 0.05 | 0.07 | 0.06 | 0.12 |
| 171704 | 0.02 | n/d | 0.00 | 0.01 | 0.02 | 0.00 | 0.01 | n/d | 0.00 | 0.01 | n/d | 0.00 |
| 171705 | n/d | 0.07 | 0.00 | n/d | 0.02 | 0.11 | 0.00 | 0.02 | 0.00 | 0.01 | 0.01 | 0.00 |
| 174001 | 0.08 | 0.00 | 0.07 | 0.08 | 0.00 | 0.18 | 0.11 | 0.00 | 0.01 | 0.04 | n/d | 0.07 |
| 174002 | 0.07 | 0.01 | 0.00 | 0.03 | 0.21 | 0.10 | 0.01 | 0.01 | 0.00 | n/d | 0.00 | n/d |
| 174003 | 0.61 | 0.00 | 0.41 | 0.33 | 0.01 | 0.21 | 0.05 | 0.00 | 0.00 | 0.09 | 0.05 | 0.13 |
| 174004 | 0.12 | 0.00 | 0.00 | 0.05 | 0.21 | 0.00 | 0.05 | n/d | 0.00 | 0.00 | n/d | 0.00 |
| 174005 | 0.01 | 0.50 | 0.01 | 0.20 | 0.01 | 0.17 | 0.40 | 0.02 | 0.00 | 0.21 | 0.06 | 0.00 |
| 174101 | 0.33 | 0.13 | 0.00 | 0.46 | 0.76 | 0.05 | 0.68 | 0.56 | 0.25 | 0.04 | 0.14 | 0.19 |
| 174102 | 0.19 | 0.49 | 0.53 | 0.03 | 0.80 | 0.80 | 0.54 | 0.48 | 0.03 | 0.03 | 0.46 | 0.75 |
| 174103 | 0.04 | 0.15 | 0.07 | 0.02 | 0.25 | 0.04 | 0.53 | 0.16 | 0.45 | 0.06 | 0.00 | 0.03 |
| 174104 | n/d | 0.00 | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.01 |
| 174105 | n/d | 0.00 | 0.02 | n/d | 0.00 | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.02 |
| 174201 | 0.00 | 0.00 | 0.07 | 0.01 | 0.00 | 0.37 | 0.19 | 0.00 | 0.00 | 0.00 | n/d | 0.04 |
| 174202 | 0.10 | 0.00 | 0.00 | 0.15 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | n/d |
| 174203 | 0.02 | n/d | 0.19 | 0.18 | 0.00 | 0.23 | 0.37 | n/d | 0.00 | 0.01 | 0.00 | 0.00 |
| 174204 | 0.01 | n/d | 0.00 | 0.01 | 0.02 | 0.00 | 0.00 | n/d | 0.00 | 0.01 | n/d | 0.00 |
| 174205 | 0.17 | 0.01 | 0.00 | 0.09 | 0.01 | 0.02 | 0.06 | 0.06 | n/d | 0.44 | 0.01 | 0.00 |
| 174301 | 0.05 | 0.11 | 0.00 | 0.02 | 0.77 | 0.78 | 0.43 | 0.58 | 0.31 | 0.90 | 0.03 | 0.26 |
| 174302 | 0.01 | 0.61 | 0.08 | 0.08 | 0.07 | 0.70 | 0.40 | 0.13 | 0.00 | 0.06 | 0.58 | 0.65 |
| 174303 | 0.18 | 0.03 | 0.00 | 0.26 | 0.40 | 0.82 | 0.67 | 0.36 | 0.27 | 0.19 | 0.03 | 0.46 |
| 174304 | n/d | 0.00 | n/d | 0.00 | 0.00 | n/d | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 |
| 174305 | n/d | 0.00 | 0.00 | n/d | 0.00 | 0.12 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.00 |
| 184401 | 0.01 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.15 | 0.00 | n/d | n/d | 0.00 | n/d |
| 184402 | n/d | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | n/d | 0.00 | 0.00 | 0.00 | n/d |
| 184403 | 0.01 | n/d | 0.00 | 0.00 | 0.00 | n/d | 0.03 | 0.00 | n/d | n/d | 0.00 | n/d |
| 184404 | 0.13 | 0.01 | n/d | n/d | 0.01 | 0.00 | 0.00 | n/d | n/d | 0.04 | 0.00 | 0.01 |
| 184405 | n/d | 0.00 | 0.00 | n/d | 0.00 | n/d | n/d | n/d | n/d | 0.00 | 0.00 | 0.00 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 190101 | 0.64 | 0.10 | 0.47 | 0.55 | 0.17 | 0.17 | 0.46 | 0.85 | 0.21 | 0.21 | 0.56 | 0.22 |
| 190102 | 0.04 | 0.02 | 0.79 | 0.27 | 0.22 | 0.27 | 0.42 | 0.55 | 0.83 | 0.34 | 0.37 | 0.62 |
| 190103 | 0.42 | 0.43 | 0.16 | 0.10 | 0.06 | 0.14 | 0.39 | 0.19 | 0.19 | 0.20 | 0.29 | 0.28 |
| 190104 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| 190105 | 0.30 | 0.28 | 0.20 | 0.36 | 0.23 | 0.04 | 0.04 | n/d | 0.28 | n/d | 0.16 | 0.70 |
| 191201 | 0.06 | 0.25 | 0.97 | 0.68 | 0.55 | 0.41 | 0.32 | 0.13 | 0.01 | 0.13 | 0.42 | 0.38 |
| 191202 | 0.07 | 0.22 | 0.03 | 0.46 | 0.16 | n/d | 0.18 | 0.14 | 0.11 | 0.14 | 0.51 | 0.03 |
| 191203 | 0.07 | 0.80 | 0.91 | 0.72 | 0.58 | 0.26 | 0.06 | 0.30 | 0.32 | 0.35 | 0.83 | 0.05 |
| 191204 | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d | n/d |
| 191205 | n/d | 0.00 | 0.02 | 0.08 | 0.00 | 0.01 | 0.00 | n/d | 0.00 | n/d | 0.07 | 0.01 |
| 193402 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 193403 | 0.25 | 0.19 | 0.13 | 0.02 | 0.39 | 0.39 | 0.21 | 0.57 | 0.46 | 0.83 | 0.63 | 0.23 |
| 193404 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 193405 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194501 | 0.77 | 0.33 | 0.11 | 0.21 | 0.61 | 0.41 | 0.90 | 0.08 | 0.40 | 0.18 | 0.10 | 0.71 |
| 194601 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194701 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |
| 194801 | 0.77 | 0.33 | 0.10 | 0.21 | 0.61 | 0.41 | 0.47 | 0.07 | 0.05 | 0.18 | 0.64 | 0.71 |
| 194802 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194803 | 0.20 | 0.19 | 0.13 | 0.02 | 0.40 | 0.39 | 0.21 | 0.57 | 0.46 | 0.83 | 0.64 | 0.23 |
| 194804 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194805 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 194901 | 0.46 | 0.36 | 0.58 | 0.53 | 0.87 | 0.60 | 0.39 | 0.33 | 0.21 | 0.19 | 0.53 | 0.05 |
| 194902 | 0.10 | 0.50 | 0.56 | 0.02 | 0.09 | 0.26 | 0.52 | 0.01 | 0.01 | 0.23 | 0.57 | 0.35 |
| 194903 | 0.43 | 0.02 | 0.42 | 0.64 | 0.34 | 0.38 | 0.72 | 0.49 | 0.19 | 0.54 | 0.41 | 0.38 |
| 194904 | 0.01 | 0.01 | 0.01 | 0.00 | 0.02 | 0.03 | 0.05 | 0.01 | 0.00 | 0.00 | 0.00 | 0.01 |
| 194905 | 0.10 | 0.56 | 0.04 | 0.58 | 0.40 | 0.05 | 0.48 | 0.04 | 0.01 | 0.36 | 0.10 | 0.03 |
| 205001 | 0.14 | 0.87 | 0.80 | 0.14 | 0.04 | 0.02 | 0.63 | 0.51 | 0.01 | 0.16 | 0.56 | 0.31 |
| 205002 | 0.29 | 0.58 | 0.16 | 0.69 | 0.57 | 0.11 | 0.26 | 0.40 | 0.35 | 0.10 | 0.05 | 0.06 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 205003 | 0.31 | 0.33 | 0.45 | 0.31 | 0.55 | 0.18 | 0.68 | 0.52 | 0.02 | 0.82 | 0.81 | 0.41 |
| 205004 | 0.42 | 0.46 | 0.94 | n/d | 0.67 | 0.33 | 0.16 | 0.10 | 0.07 | n/d | n/d | 0.17 |
| 205005 | 0.28 | 0.01 | 0.84 | 0.31 | 0.09 | 0.03 | 0.10 | 0.14 | 0.51 | 0.28 | 0.34 | 0.28 |
| 205101 | 0.57 | 0.14 | 0.29 | 0.42 | 0.48 | 0.49 | 0.40 | 0.77 | 0.40 | 0.62 | 0.20 | 0.30 |
| 205102 | 0.06 | 0.57 | 0.41 | 0.08 | n/d | 0.23 | 0.75 | 0.07 | 0.60 | n/d | 0.22 | 0.13 |
| 205103 | 0.03 | 0.62 | 0.61 | 0.16 | 0.60 | 0.90 | 0.96 | 0.07 | 0.42 | 0.18 | 0.27 | 0.05 |
| 205104 | 0.03 | 0.11 | 0.74 | n/d | n/d | 0.47 | 0.03 | 0.31 | 0.55 | n/d | n/d | 0.00 |
| 205105 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.05 | 0.92 | 0.00 | 0.01 | 0.00 |
| 205201 | 0.20 | 0.32 | 0.50 | 0.20 | 0.35 | 0.60 | 0.10 | 0.70 | 0.26 | 0.05 | 0.78 | 0.82 |
| 205202 | 0.72 | 0.49 | 0.26 | 0.35 | 0.23 | 0.91 | 0.68 | 0.94 | 0.16 | 0.04 | 0.69 | 0.09 |
| 205203 | 0.24 | 0.34 | 0.40 | 0.25 | 0.48 | 0.31 | 0.29 | 0.39 | 0.24 | 0.37 | 0.53 | 0.66 |
| 205204 | 0.50 | 0.85 | 0.67 | n/d | n/d | 0.21 | 0.66 | 0.59 | 0.78 | n/d | n/d | 0.48 |
| 205205 | 0.03 | 0.40 | 0.69 | 0.13 | 0.04 | 0.04 | 0.04 | 0.00 | 0.39 | 0.33 | 0.39 | 0.25 |
| 205301 | 0.89 | 0.06 | 0.65 | 0.94 | 0.39 | 0.12 | 0.86 | 0.19 | 0.25 | 0.73 | 0.33 | 0.35 |
| 205302 | 0.52 | 0.11 | 0.26 | 0.00 | 0.05 | 0.56 | 0.18 | 0.27 | 0.99 | n/d | n/d | 0.97 |
| 205303 | 0.67 | 0.29 | 0.11 | 0.90 | 0.02 | 0.01 | 0.15 | 0.20 | 0.17 | 0.75 | 0.21 | 0.21 |
| 205304 | 0.10 | 0.28 | 0.01 | n/d | n/d | 0.23 | 0.10 | 0.73 | 0.37 | n/d | n/d | 0.45 |
| 205305 | 0.17 | 0.80 | 0.31 | 0.02 | 0.54 | 0.50 | 0.12 | 0.99 | 0.29 | 0.00 | 0.55 | 0.26 |
| 205401 | 0.27 | 0.55 | 0.35 | 0.00 | 0.55 | 0.00 | 0.10 | 0.70 | 0.15 | 0.31 | 0.25 | 0.04 |
| 205402 | 0.00 | 0.02 | 0.00 | n/d | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | n/d | 0.01 | 0.00 |
| 205403 | 0.27 | 0.45 | 0.62 | 0.13 | 0.02 | 0.75 | 0.14 | 0.17 | 0.47 | 0.00 | 0.36 | 0.61 |
| 205404 | 0.00 | 0.00 | 0.00 | n/d | n/d | 0.02 | 0.00 | 0.37 | 0.20 | n/d | n/d | 0.00 |
| 205405 | 0.00 | 0.00 | 0.00 | n/d | 0.00 | 0.03 | 0.00 | 0.01 | 0.29 | n/d | 0.03 | 0.03 |
| 205501 | 0.23 | 0.27 | 0.21 | 0.38 | 0.71 | 0.34 | 0.62 | 0.25 | 0.98 | 0.84 | 0.03 | 0.91 |
| 205502 | 0.43 | 0.65 | 0.53 | 0.01 | 0.03 | 0.68 | 0.01 | 0.35 | 0.85 | n/d | 0.21 | 0.05 |
| 205503 | 0.25 | 0.58 | 0.58 | 0.39 | 0.33 | 0.60 | 0.14 | 0.35 | 0.45 | 0.32 | 0.05 | 0.28 |
| 205504 | 0.01 | 0.47 | 0.49 | n/d | n/d | 0.23 | 0.23 | 0.06 | 0.25 | n/d | n/d | 0.48 |
| 205505 | 0.68 | 0.95 | 0.01 | 0.01 | 0.68 | 0.45 | 0.79 | 0.53 | 0.61 | 0.00 | 0.32 | 0.19 |
| 205601 | 0.14 | 0.25 | 0.73 | 0.12 | 0.27 | 0.06 | 0.78 | 0.54 | 0.02 | 0.86 | 0.86 | 0.15 |

| ID | 2131 | 2132 | 2133 | 2231 | 2232 | 2233 | 3131 | 3132 | 3133 | 3231 | 3232 | 3233 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **205602** | 0.27 | 0.52 | 0.56 | 0.00 | 0.01 | 0.40 | 0.54 | 0.20 | 0.85 | 0.00 | 0.02 | 0.50 |
| **205603** | 0.85 | 0.68 | 0.75 | 0.05 | 0.01 | 0.18 | 0.17 | 0.14 | 0.01 | 0.76 | 0.63 | 0.73 |
| **205604** | 0.03 | 0.83 | 0.72 | 0.00 | 0.00 | 0.92 | 0.03 | 0.04 | 0.60 | 0.00 | 0.00 | 0.03 |
| **205605** | 0.90 | 0.70 | 0.11 | 0.45 | 0.25 | 0.40 | 0.61 | 0.14 | 0.44 | 0.76 | 0.63 | 0.07 |
| **205701** | 0.59 | 0.22 | 0.10 | 0.67 | 0.83 | 0.33 | 0.00 | 0.86 | 0.57 | 0.26 | 0.04 | 0.40 |
| **205702** | 0.78 | 0.08 | 0.81 | 0.13 | 0.12 | 0.74 | 0.81 | 0.32 | 0.85 | 0.28 | 0.03 | 0.09 |
| **205703** | 0.27 | 0.59 | 0.35 | 0.19 | 0.56 | 0.74 | 0.02 | 0.35 | 0.76 | 0.89 | 0.02 | 0.61 |
| **205704** | 0.03 | 0.58 | 0.16 | 0.00 | 0.00 | 0.17 | 0.55 | 0.05 | 0.60 | 0.00 | 0.01 | 0.06 |
| **205705** | 0.41 | 0.34 | 0.18 | 0.00 | 0.07 | 0.34 | 0.26 | 0.44 | 0.48 | 0.00 | 0.02 | 0.15 |
| **205801** | 0.17 | 0.25 | 0.38 | 0.03 | 0.18 | 0.31 | 0.10 | 0.47 | 0.97 | 0.07 | 0.44 | 0.11 |
| **205802** | 0.34 | 0.27 | 0.06 | 0.00 | 0.04 | 0.64 | 0.82 | 0.74 | 0.42 | 0.07 | 0.23 | 0.24 |
| **205803** | 0.42 | 0.36 | 0.41 | 0.69 | 0.38 | 0.79 | 0.39 | 0.54 | 0.04 | 0.31 | 0.82 | 0.37 |
| **205804** | 0.30 | 0.47 | 0.14 | 0.00 | 0.00 | 0.37 | 0.10 | 0.23 | 0.81 | 0.00 | 0.00 | 0.64 |
| **205805** | 0.48 | 0.04 | 0.55 | 0.16 | 0.94 | 0.80 | 0.69 | 0.66 | 0.35 | 0.66 | 0.72 | 0.58 |
| **210101** | 0.52 | 0.31 | 0.16 | 0.01 | 0.02 | 0.06 | 0.07 | 0.93 | 0.45 | 0.24 | 0.55 | 0.12 |
| **210102** | 0.16 | 0.16 | 0.00 | 0.03 | 0.96 | 0.00 | 0.82 | 0.27 | 0.71 | 0.23 | 0.02 | 0.10 |
| **210103** | 0.41 | 0.89 | 0.34 | 0.11 | 0.21 | 0.07 | 0.33 | 0.68 | 0.75 | 0.15 | 0.38 | 0.18 |
| **210104** | 0.45 | 0.33 | 0.26 | 0.06 | 0.24 | 0.68 | 0.53 | 0.60 | 0.34 | 0.05 | 0.05 | 0.87 |
| **210105** | 0.14 | 0.82 | 0.28 | 0.08 | 0.89 | 0.49 | 0.35 | 0.20 | 0.85 | 0.17 | 0.34 | 0.00 |
| **211201** | 0.97 | 0.32 | 0.40 | 0.91 | 0.34 | 0.13 | 0.66 | 0.75 | 0.43 | 0.83 | 0.46 | 0.09 |
| **211202** | 0.15 | 0.01 | 0.80 | 0.38 | 0.16 | 0.65 | 0.36 | 0.36 | 0.21 | 0.82 | 0.22 | 0.74 |
| **211203** | 0.94 | 0.13 | 0.03 | 0.87 | 0.04 | 0.17 | 0.53 | 0.73 | 0.39 | 0.77 | 0.93 | 0.03 |
| **211204** | 0.68 | 0.53 | 0.39 | 0.26 | 0.04 | 0.45 | 0.09 | 0.70 | 0.30 | 0.17 | 0.06 | 0.55 |
| **211205** | 0.45 | 0.12 | 0.05 | 0.21 | 0.07 | 0.04 | 0.33 | 0.04 | 0.31 | 0.03 | 0.96 | 0.00 |
| **214901** | 0.48 | 0.52 | 0.07 | 0.09 | 0.39 | 0.66 | 0.41 | 0.31 | 0.12 | 0.33 | 0.76 | 0.66 |
| **214902** | 0.23 | 0.82 | 0.00 | 0.55 | 0.22 | 0.00 | 0.58 | 0.23 | 0.85 | 0.61 | 0.23 | 0.03 |
| **214903** | 0.70 | 0.64 | 0.21 | 0.34 | 0.57 | 0.88 | 0.13 | 0.57 | 0.32 | 0.73 | 0.85 | 0.26 |
| **214904** | 0.38 | 0.75 | 0.04 | 0.48 | 0.43 | 0.00 | 0.21 | 0.43 | 0.24 | 0.29 | 0.23 | 0.12 |
| **214905** | 0.45 | 0.81 | 0.52 | 0.14 | 0.41 | 0.41 | 0.26 | 0.28 | 0.53 | 0.02 | 0.25 | 0.05 |

# Appendix D Error analysis, confidence intervals

A 95% Confidence Interval is a range of values in which a parameter is likely to be with a 95% chance. Ideally one should aim for the smaller possible confidence interval, in this way the parameter is totally determined. However, in most cases that is not possible. Therefore, a confidence interval has to be understood as an error measure.

If X is a random **normal** variable with unknown mean and variance, the CI **for the mean** is given by the formula:

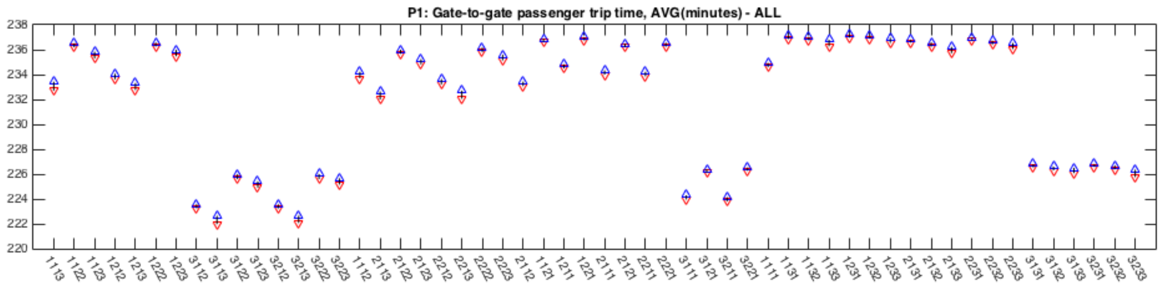
$$(\bar{x} - t^* \frac{s}{\sqrt{n}}, \bar{x} + t^* \frac{s}{\sqrt{n}})$$

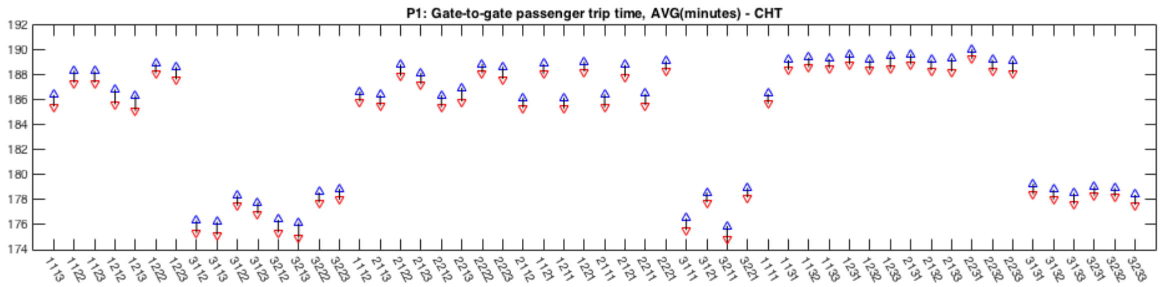
Where s is the sample standard deviation, n is the number of samples and t* is the value of the t-distribution with alpha equal to the desired confidence level.

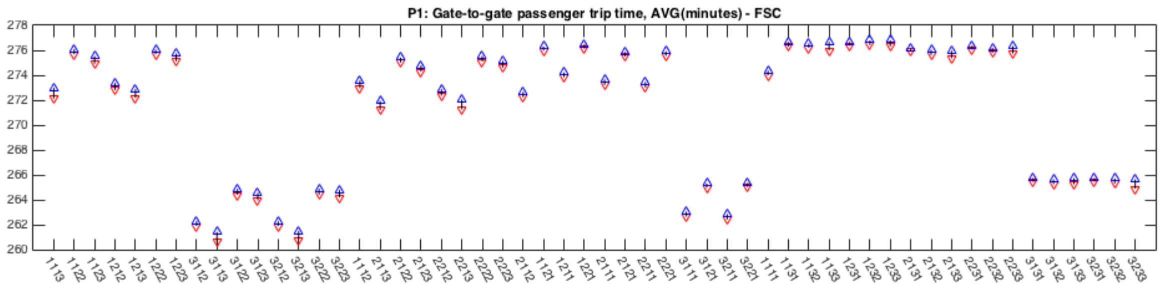
Note that the range extremes are inversely proportional to the number of samples n but directly proportional to the sample dispersion measured by s. For variables with high dispersion a large number of samples is necessary to reduce the error.

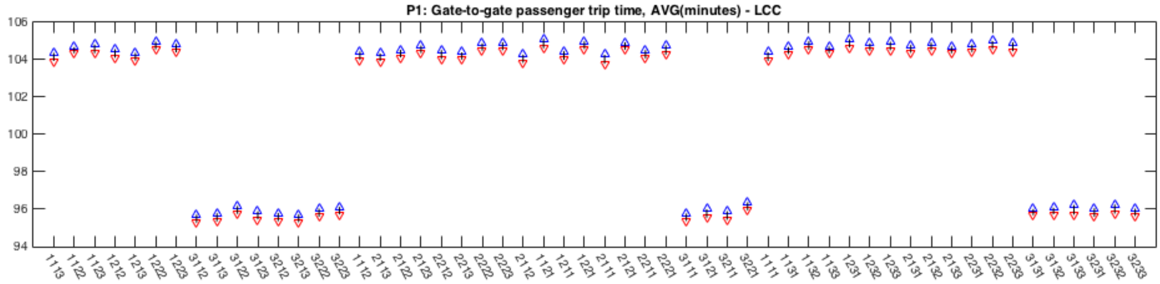
This statistic tests are fundamental prior to the analysis of results, conclusions based on poorly estimated parameters, e.g. large confidence intervals, could be misleading.

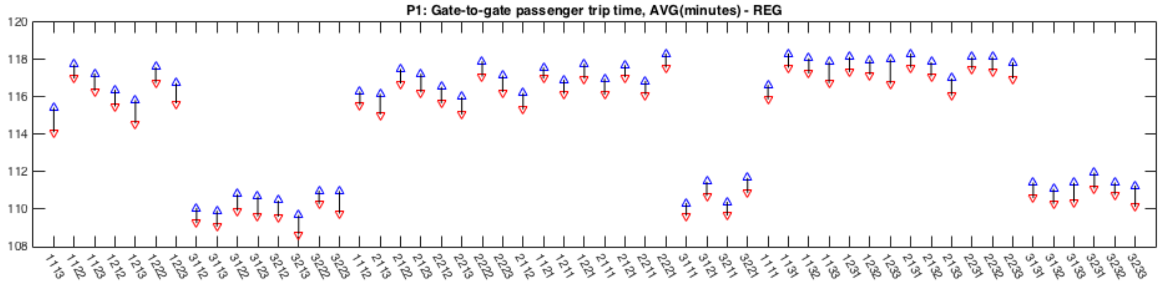
The following figures show the 95% confidence intervals for all combinations of metrics and scenarios. The blue and red triangles are the maximum and minimum likely values respectively.

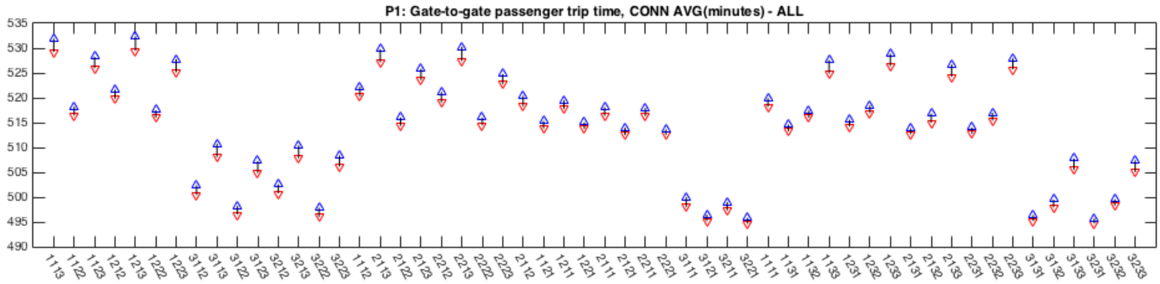


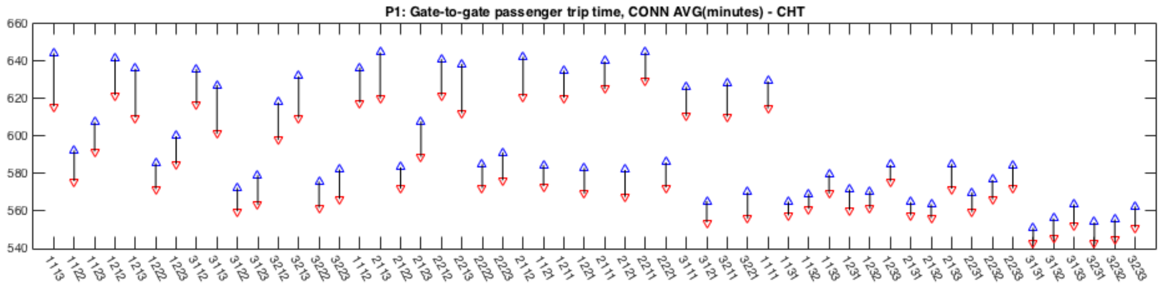



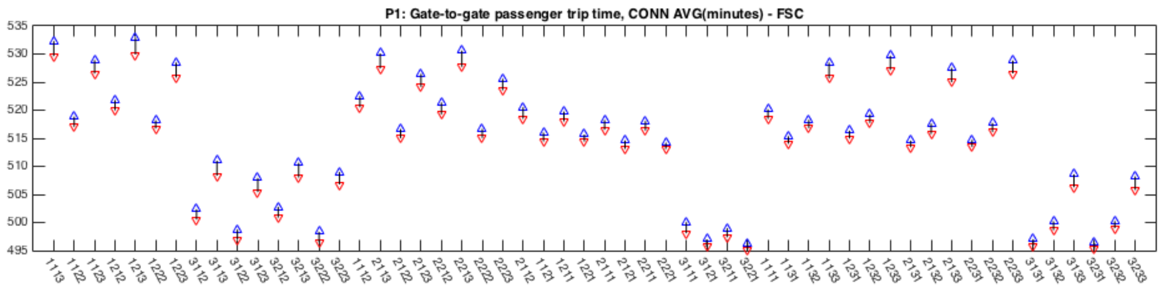



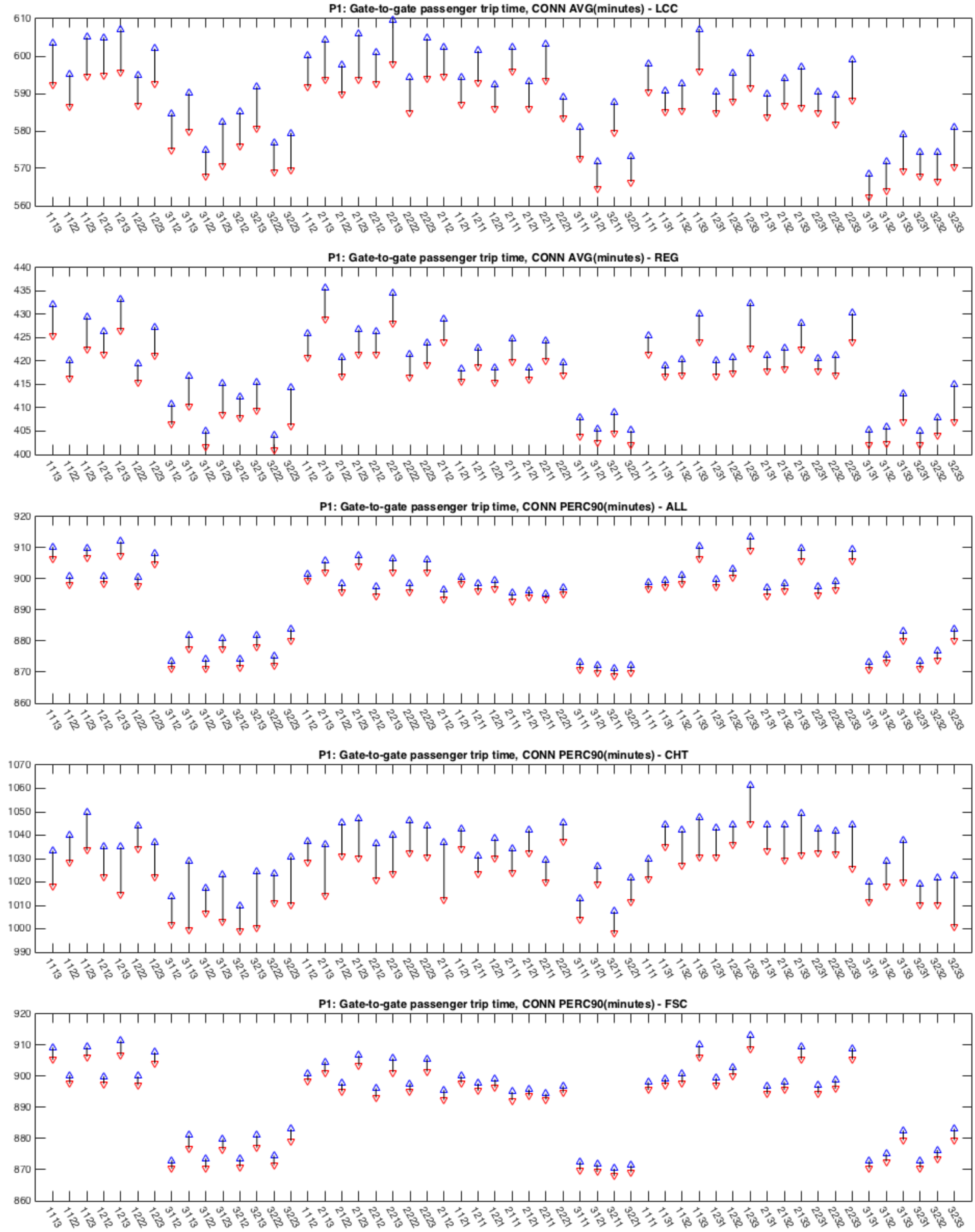

P1: Gate-to-gate passenger trip time, AVG(minutes) - LCC

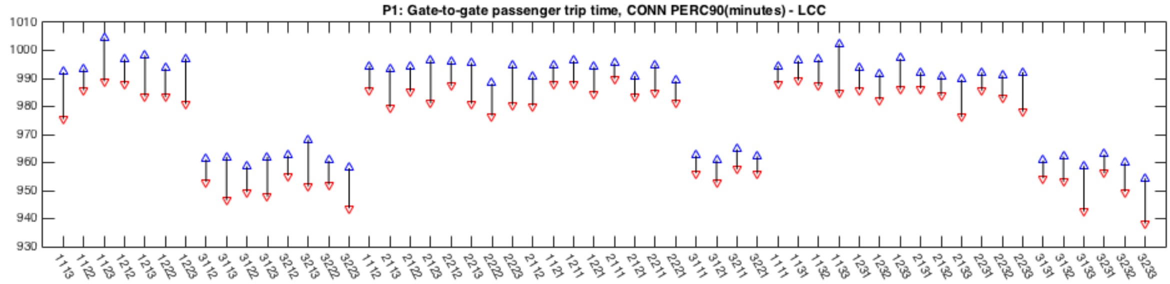

P1: Gate-to-gate passenger trip time, AVG(minutes) - REG

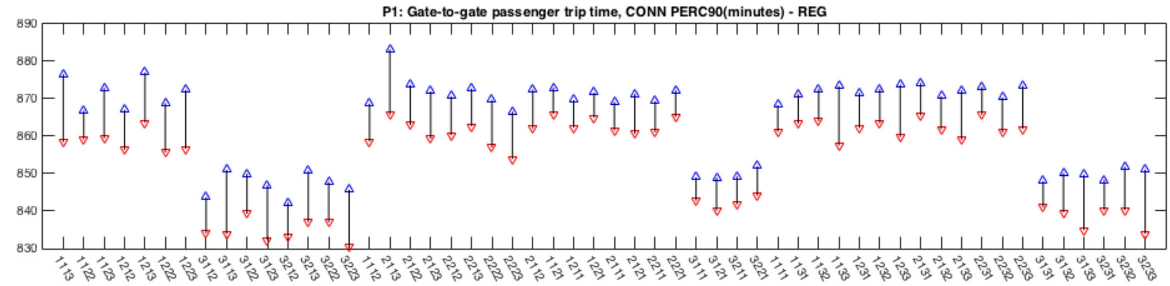

P1: Gate-to-gate passenger trip time, CONN AVG(minutes) - ALL

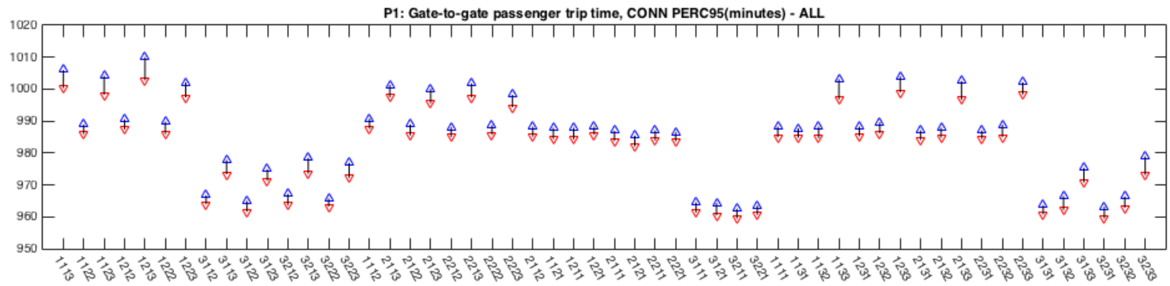

P1: Gate-to-gate passenger trip time, CONN AVG(minutes) - CHT

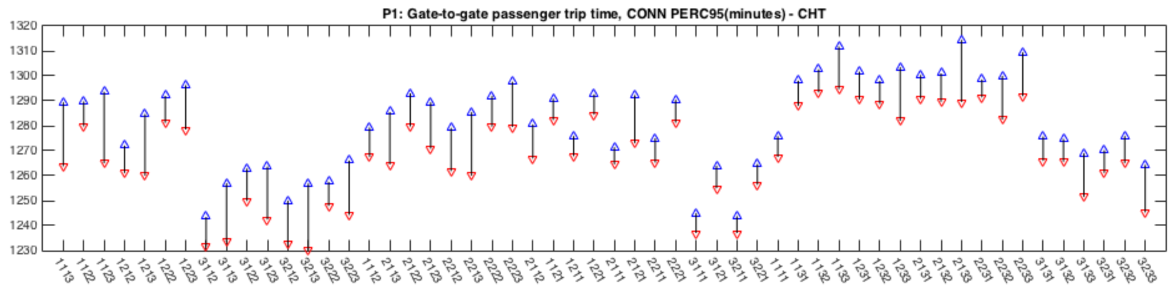

P1: Gate-to-gate passenger trip time, CONN AVG(minutes) - FSC

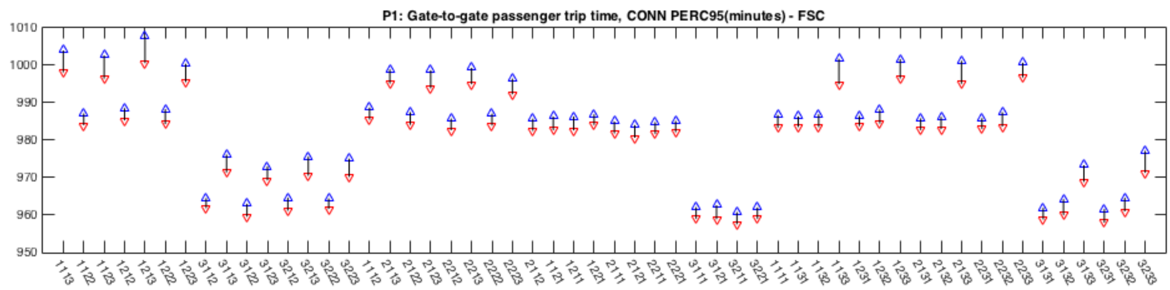

P1: Gate-to-gate passenger trip time, CONN AVG(minutes) - LCC
P1: Gate-to-gate passenger trip time, CONN AVG(minutes) - REG
P1: Gate-to-gate passenger trip time, CONN PERC90(minutes) - ALL
P1: Gate-to-gate passenger trip time, CONN PERC90(minutes) - CHT
P1: Gate-to-gate passenger trip time, CONN PERC90(minutes) - FSC

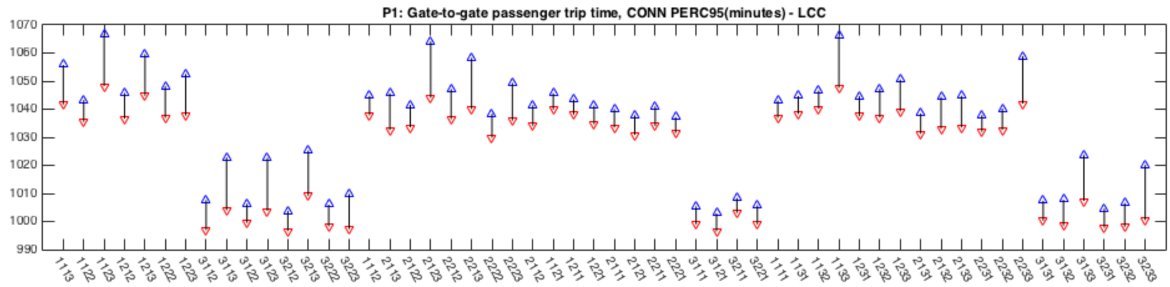

P1: Gate-to-gate passenger trip time, CONN PERC90(minutes) - LCC

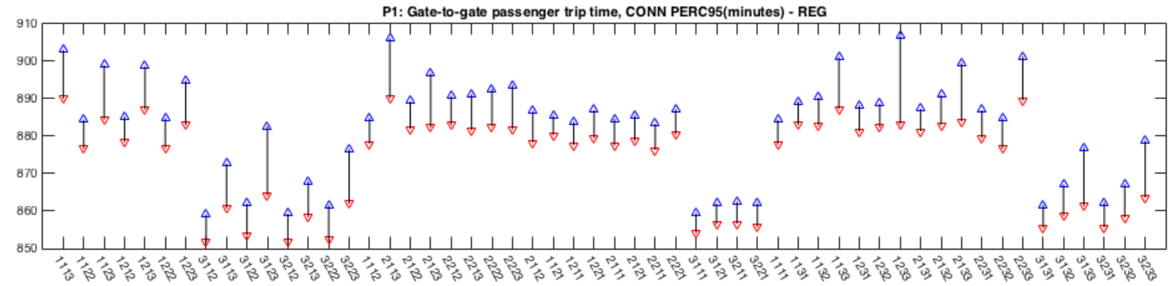

P1: Gate-to-gate passenger trip time, CONN PERC90(minutes) - REG

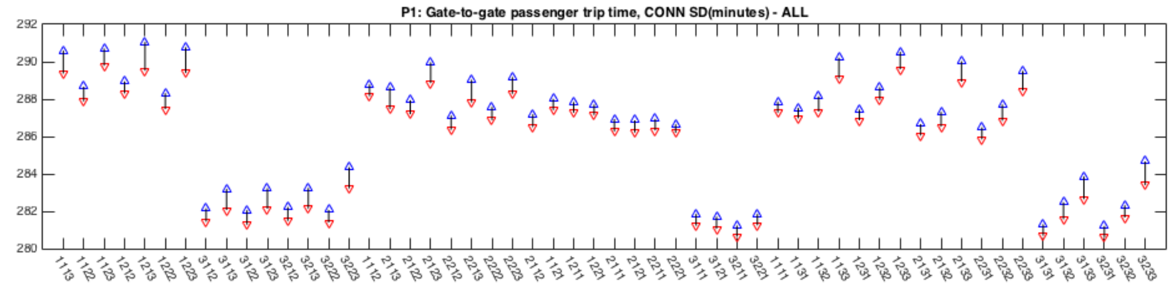

P1: Gate-to-gate passenger trip time, CONN PERC95(minutes) - ALL

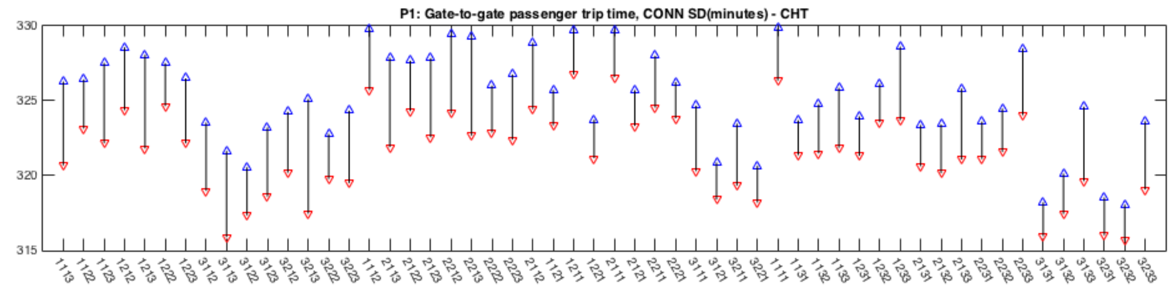

P1: Gate-to-gate passenger trip time, CONN PERC95(minutes) - CHT

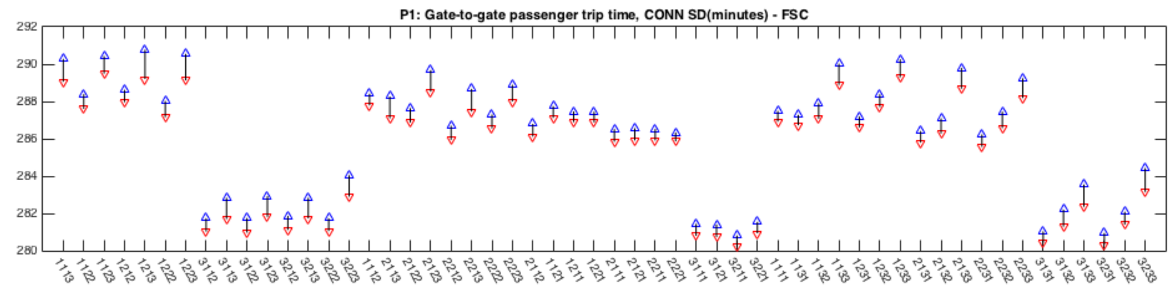

P1: Gate-to-gate passenger trip time, CONN PERC95(minutes) - FSC

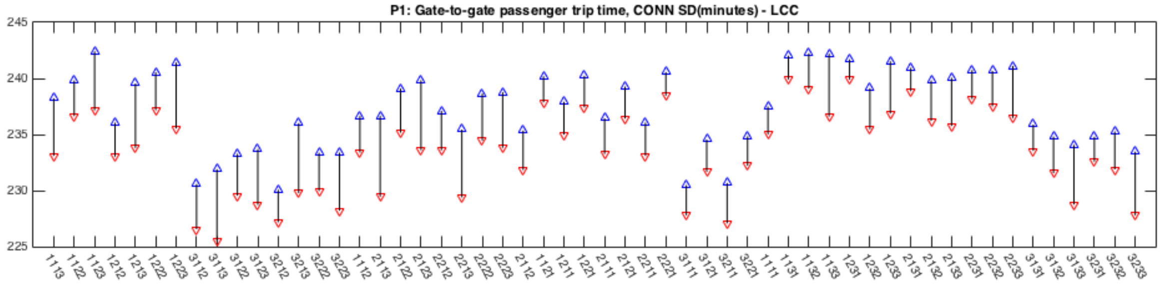

P1: Gate-to-gate passenger trip time, CONN PERC95(minutes) - LCC

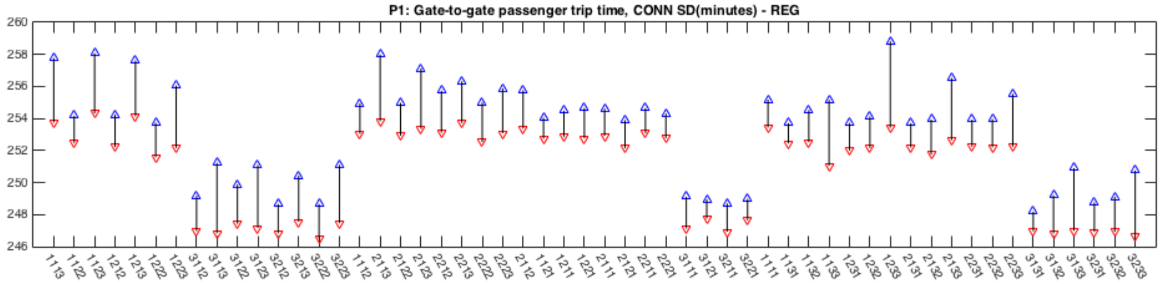

P1: Gate-to-gate passenger trip time, CONN PERC95(minutes) - REG

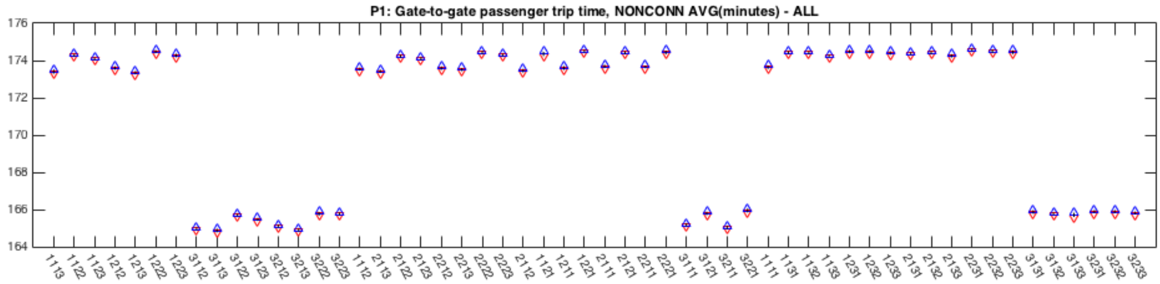

P1: Gate-to-gate passenger trip time, CONN SD(minutes) - ALL

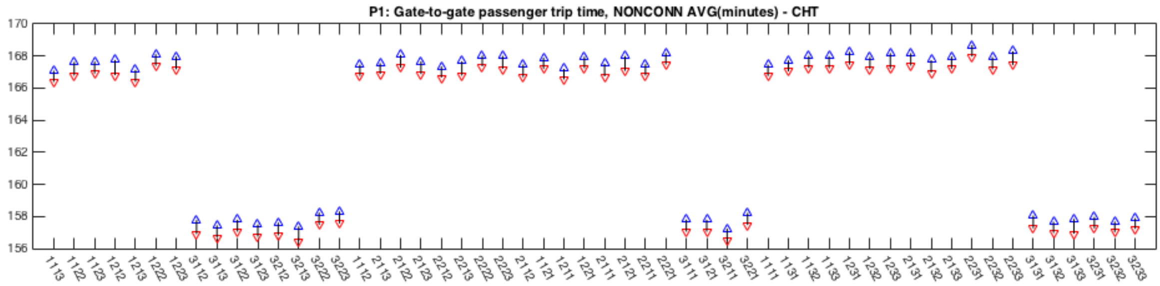

P1: Gate-to-gate passenger trip time, CONN SD(minutes) - CHT

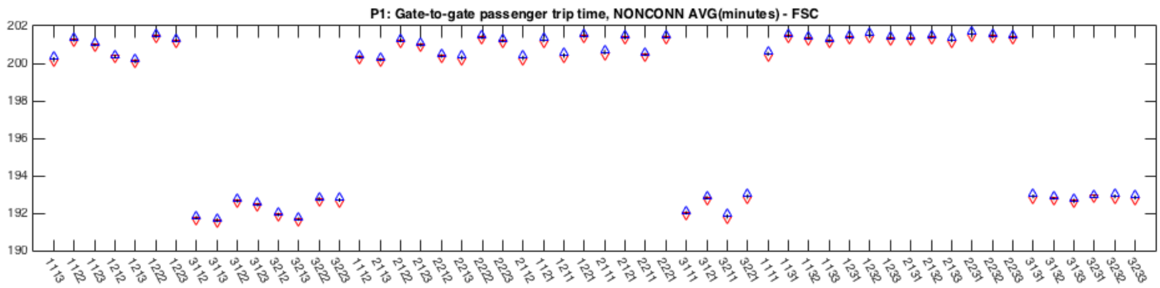

P1: Gate-to-gate passenger trip time, CONN SD(minutes) - FSC

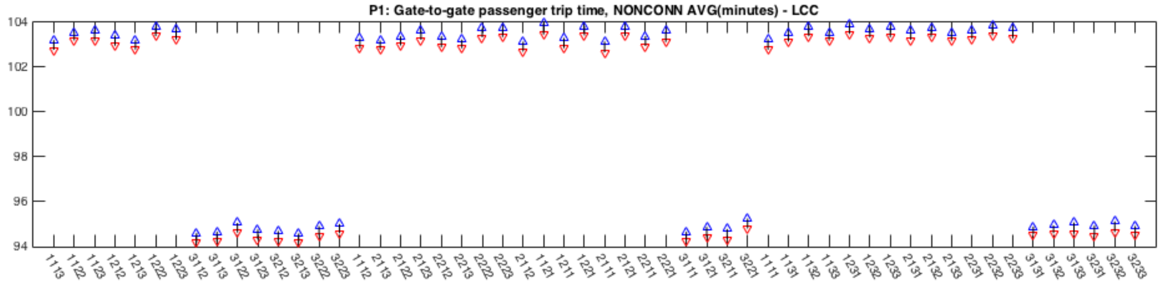

P1: Gate-to-gate passenger trip time, CONN SD(minutes) - LCC

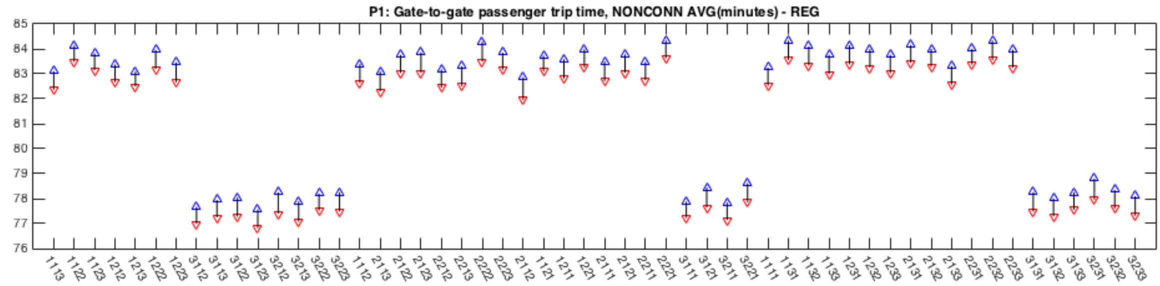

P1: Gate-to-gate passenger trip time, CONN SD(minutes) - REG

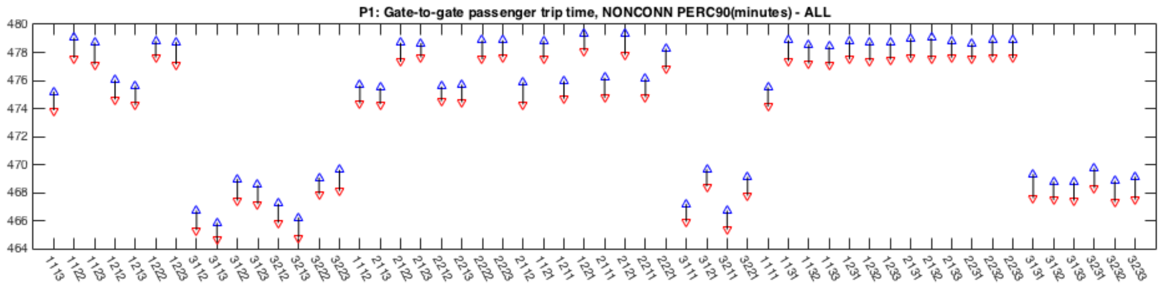

P1: Gate-to-gate passenger trip time, NONCONN AVG(minutes) - ALL

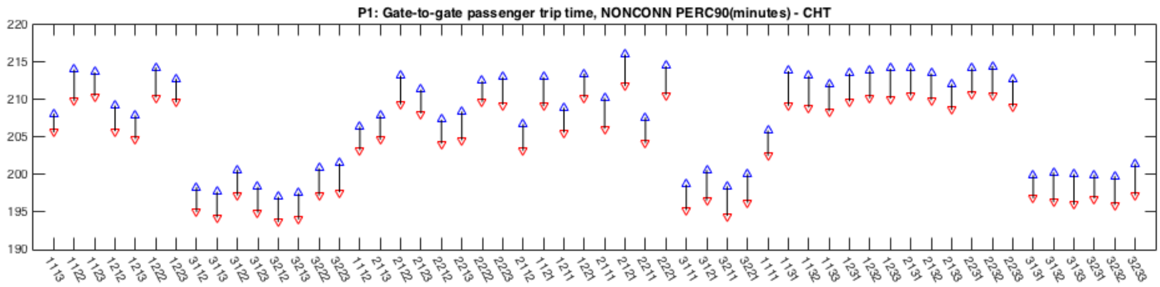

P1: Gate-to-gate passenger trip time, NONCONN AVG(minutes) - CHT

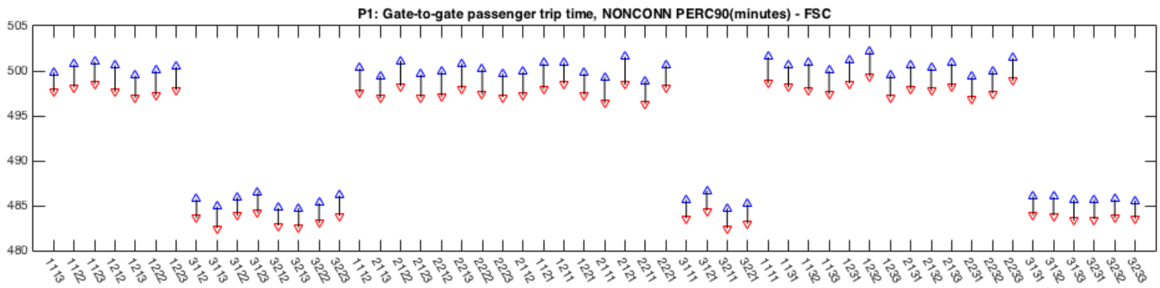

P1: Gate-to-gate passenger trip time, NONCONN AVG(minutes) - FSC

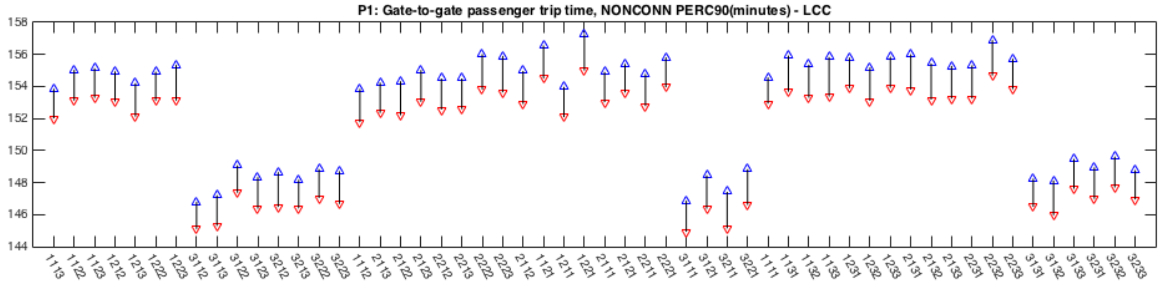

P1: Gate-to-gate passenger trip time, NONCONN AVG(minutes) - LCC

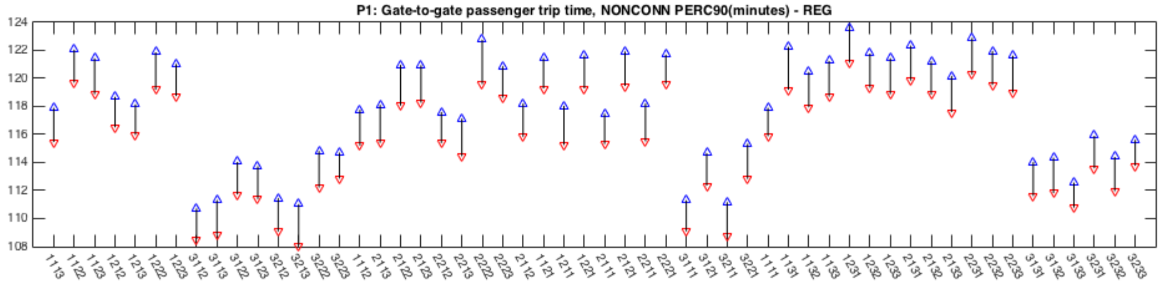

P1: Gate-to-gate passenger trip time, NONCONN AVG(minutes) - REG

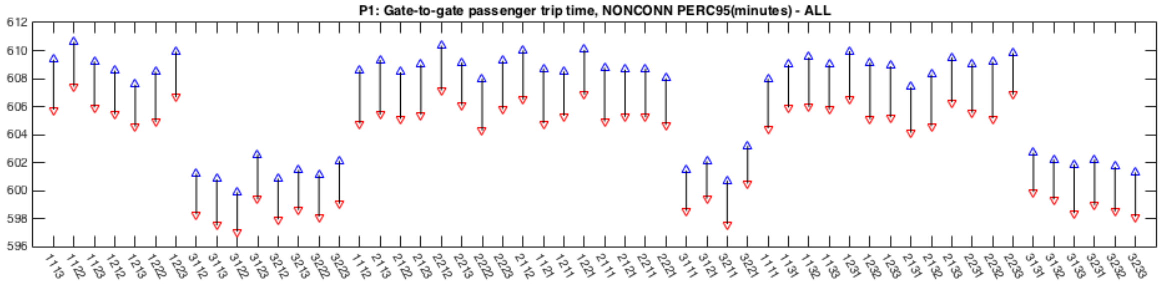

P1: Gate-to-gate passenger trip time, NONCONN PERC90(minutes) - ALL

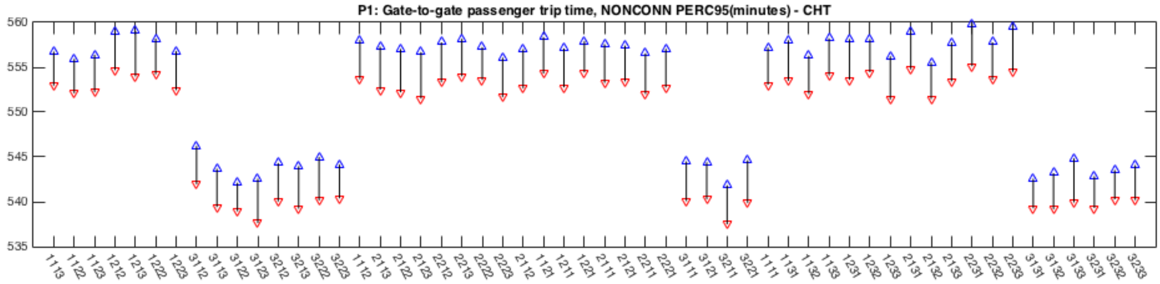

P1: Gate-to-gate passenger trip time, NONCONN PERC90(minutes) - CHT

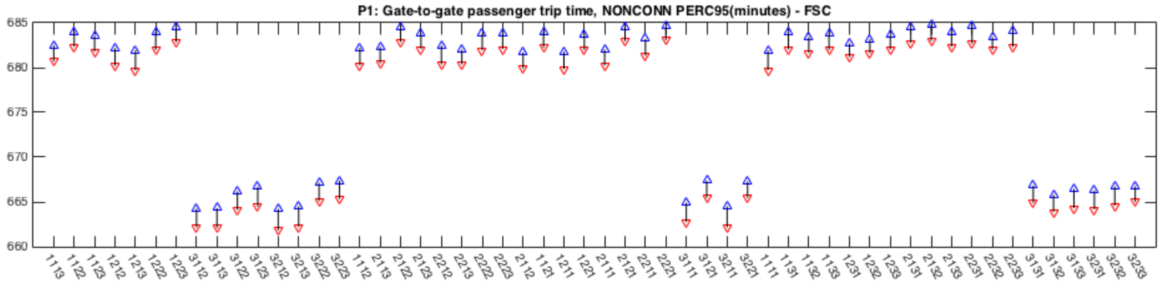

P1: Gate-to-gate passenger trip time, NONCONN PERC90(minutes) - FSC

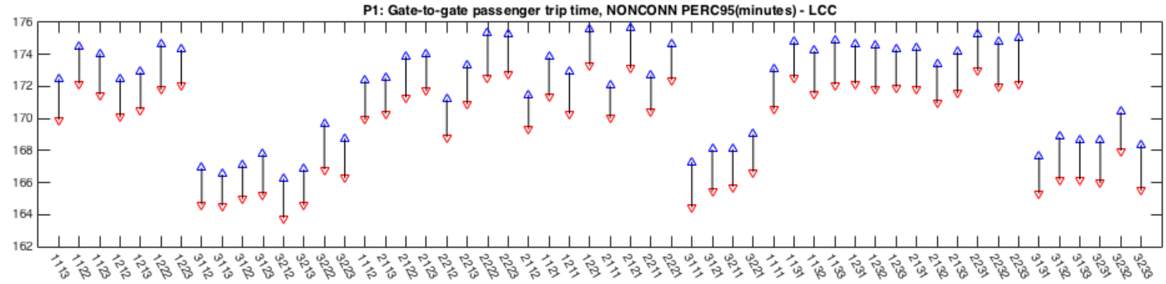

P1: Gate-to-gate passenger trip time, NONCONN PERC90(minutes) - LCC
158
156
154
152
150
148
146
144

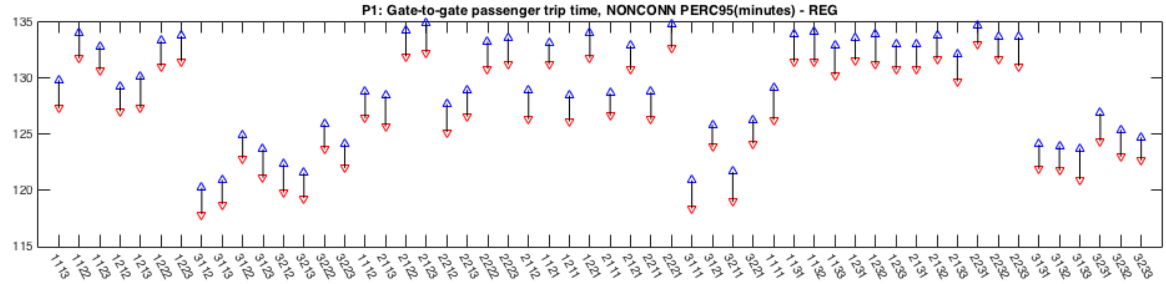

P1: Gate-to-gate passenger trip time, NONCONN PERC90(minutes) - REG
124
122
120
118
116
114
112
110
108

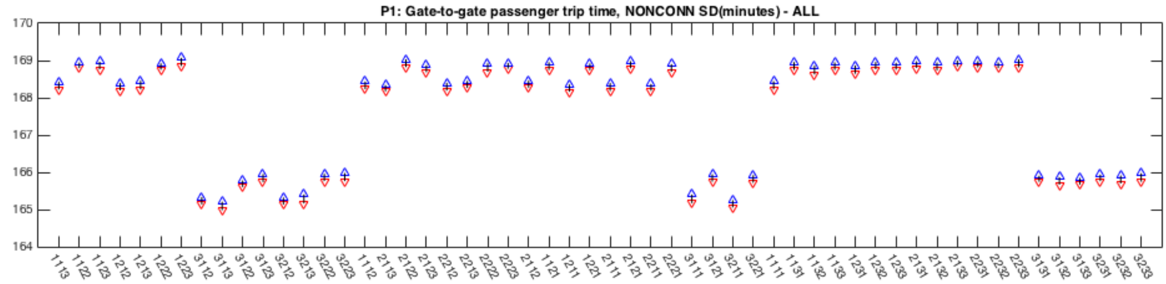

P1: Gate-to-gate passenger trip time, NONCONN PERC95(minutes) - ALL
612
610
608
606
604
602
600
598
596

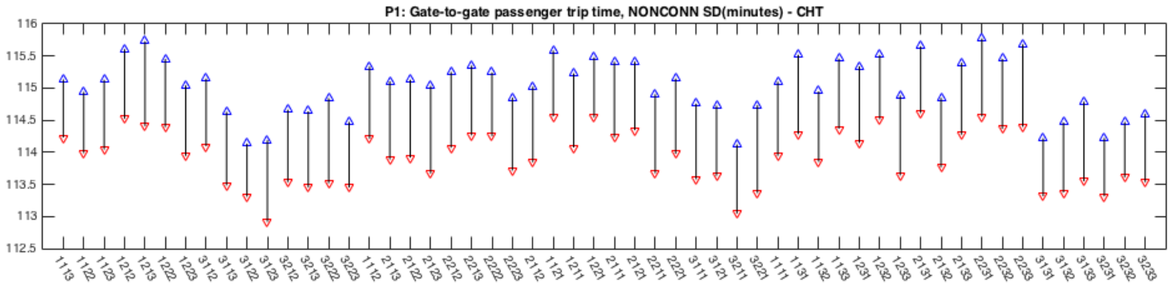

P1: Gate-to-gate passenger trip time, NONCONN PERC95(minutes) - CHT
560
555
550
545
540
535

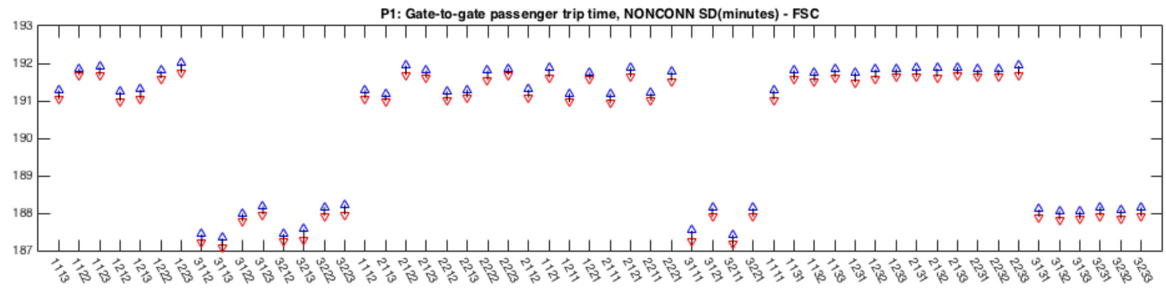

P1: Gate-to-gate passenger trip time, NONCONN PERC95(minutes) - FSC
685
680
675
670
665
660

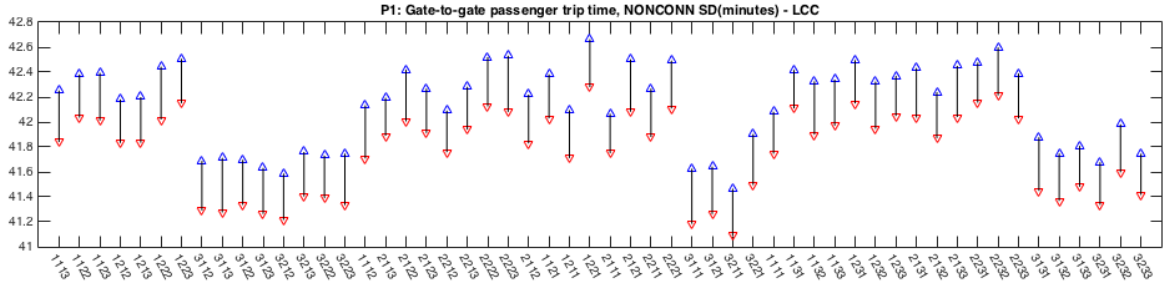

P1: Gate-to-gate passenger trip time, NONCONN PERC95(minutes) - LCC

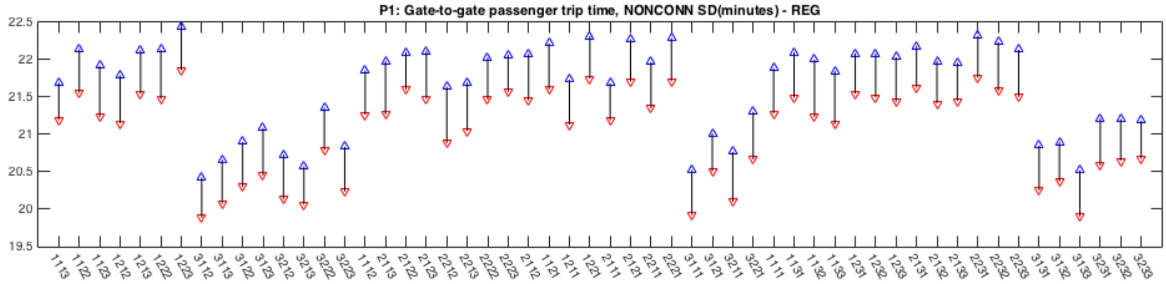

P1: Gate-to-gate passenger trip time, NONCONN PERC95(minutes) - REG

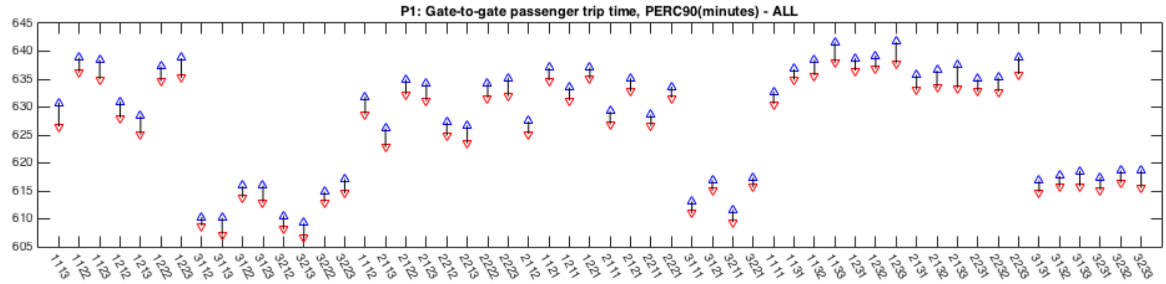

P1: Gate-to-gate passenger trip time, NONCONN SD(minutes) - ALL

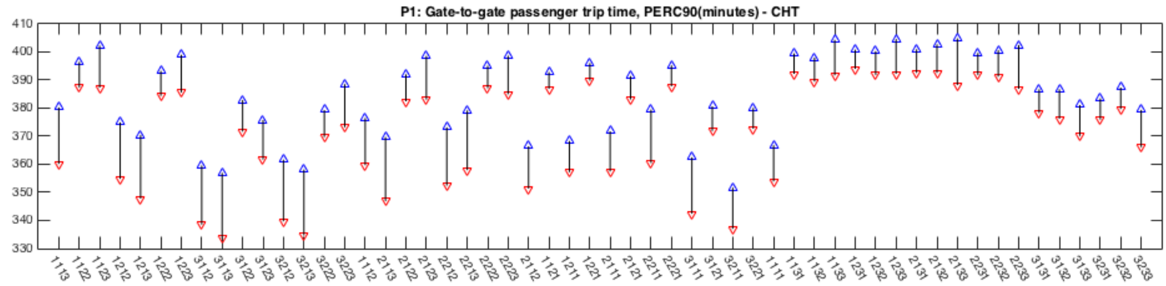

P1: Gate-to-gate passenger trip time, NONCONN SD(minutes) - CHT

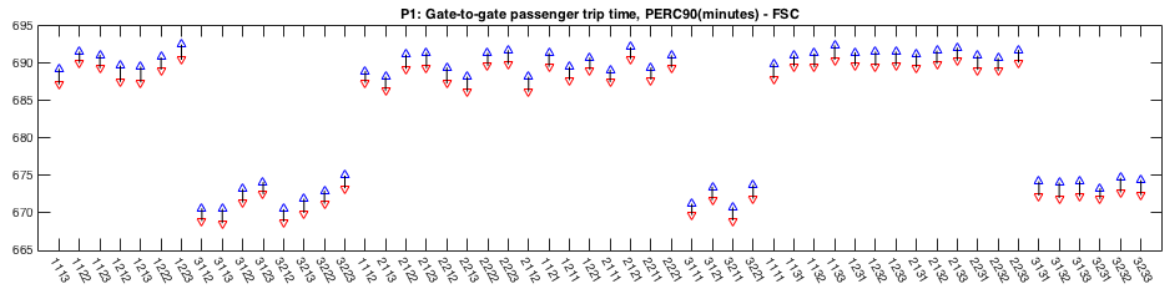

P1: Gate-to-gate passenger trip time, NONCONN SD(minutes) - FSC

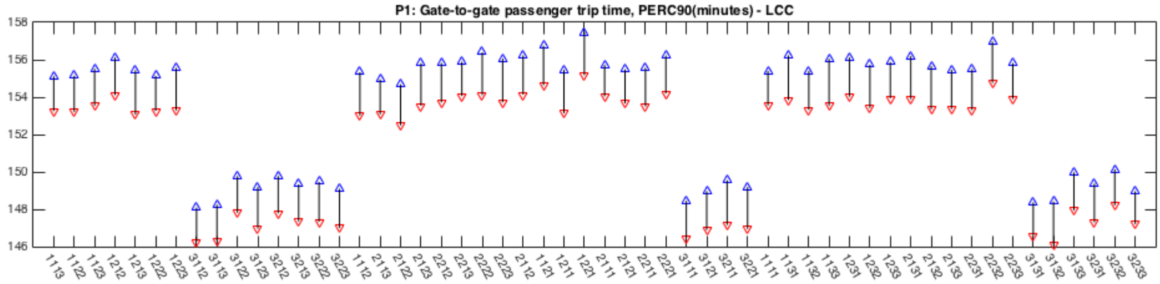

P1: Gate-to-gate passenger trip time, NONCONN SD(minutes) - LCC

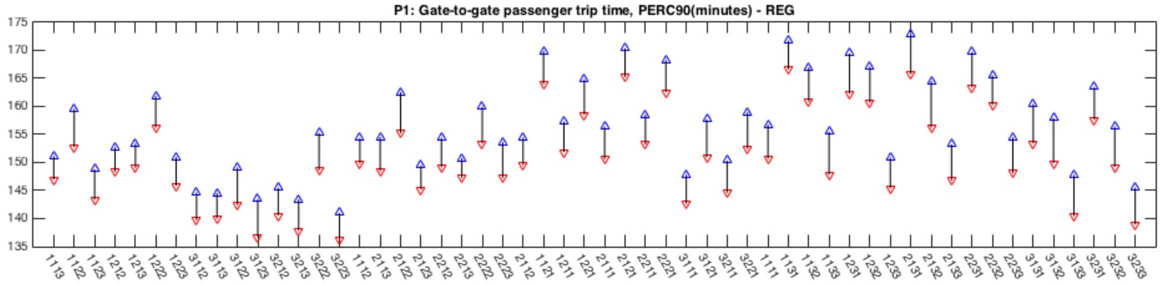

P1: Gate-to-gate passenger trip time, NONCONN SD(minutes) - REG

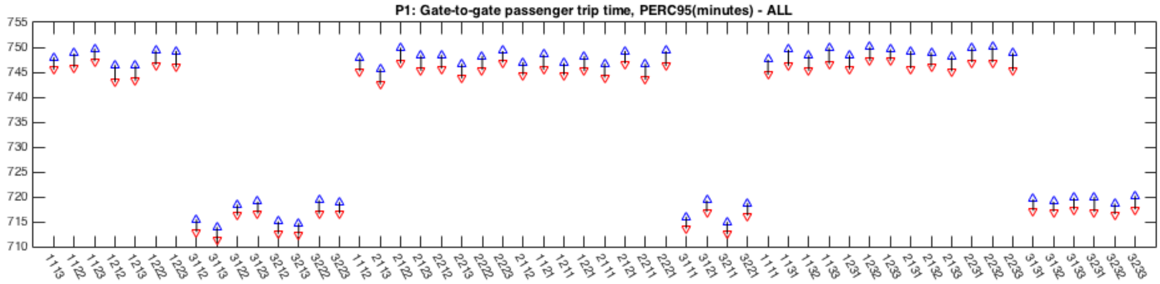

P1: Gate-to-gate passenger trip time, PERC90(minutes) - ALL

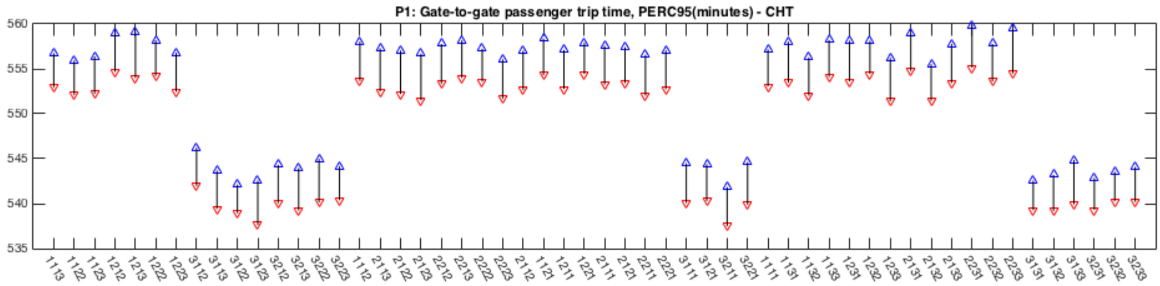

P1: Gate-to-gate passenger trip time, PERC90(minutes) - CHT

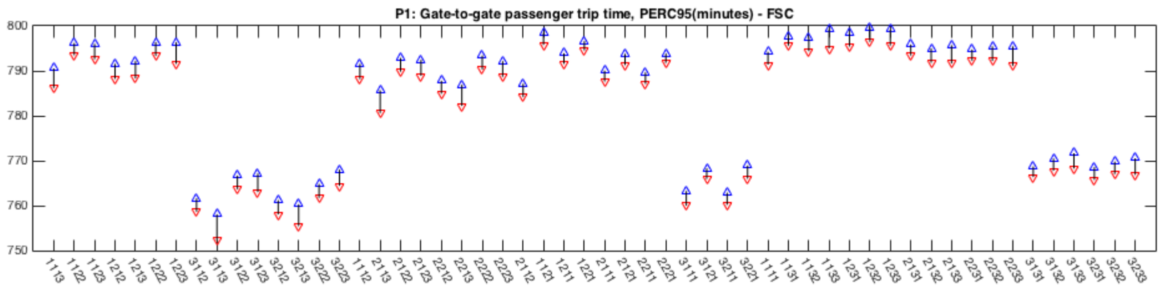

P1: Gate-to-gate passenger trip time, PERC90(minutes) - FSC

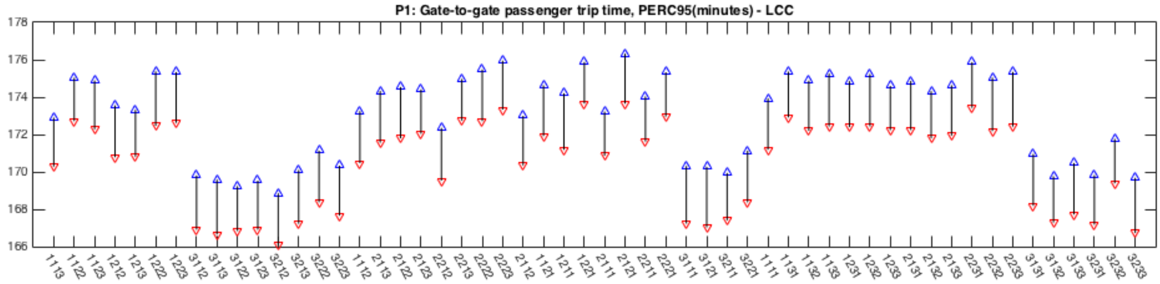

P1: Gate-to-gate passenger trip time, PERC90(minutes) - LCC
158
156
154
152
150
148
146

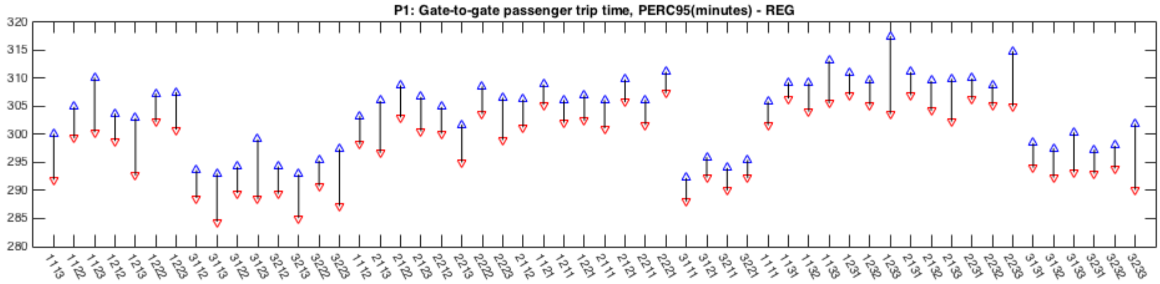

P1: Gate-to-gate passenger trip time, PERC90(minutes) - REG
175
170
165
160
155
150
145
140
135

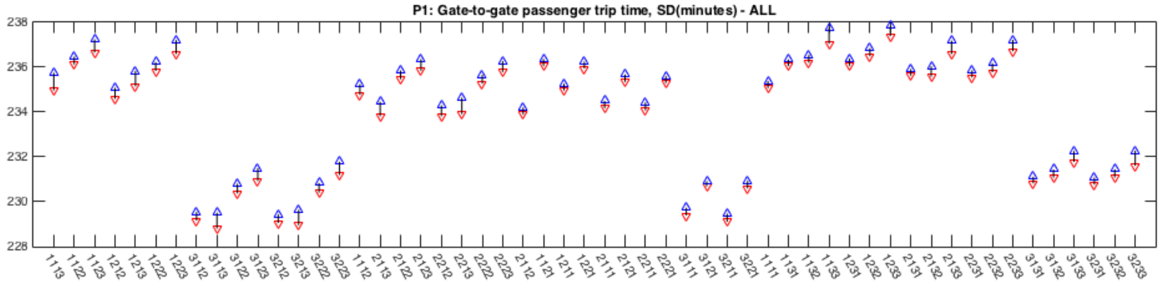

P1: Gate-to-gate passenger trip time, PERC95(minutes) - ALL
755
750
745
740
735
730
725
720
715
710

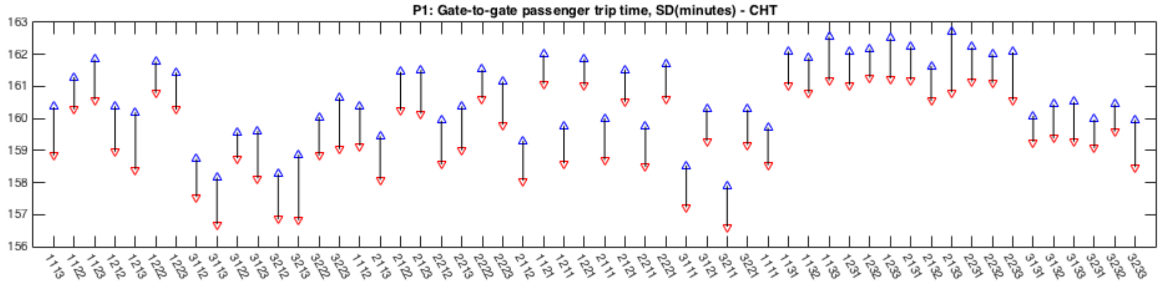

P1: Gate-to-gate passenger trip time, PERC95(minutes) - CHT
560
555
550
545
540
535

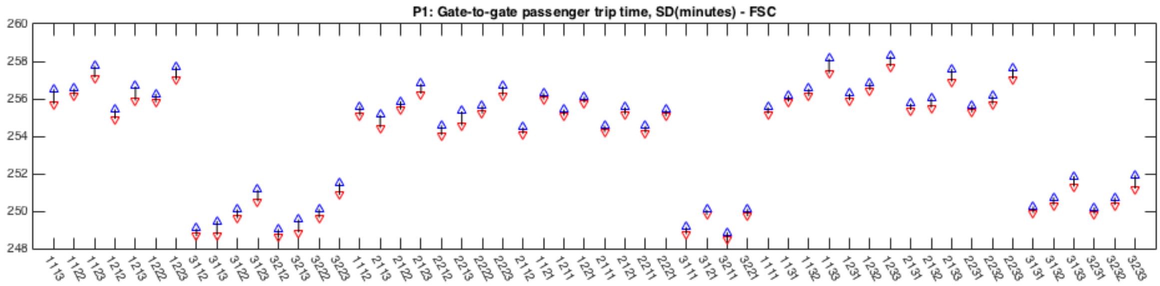

P1: Gate-to-gate passenger trip time, PERC95(minutes) - FSC
800
790
780
770
760
750

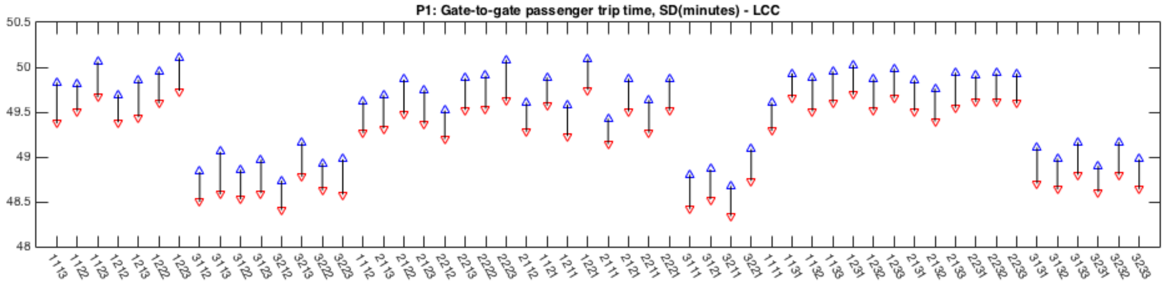

P1: Gate-to-gate passenger trip time, PERC95(minutes) - LCC

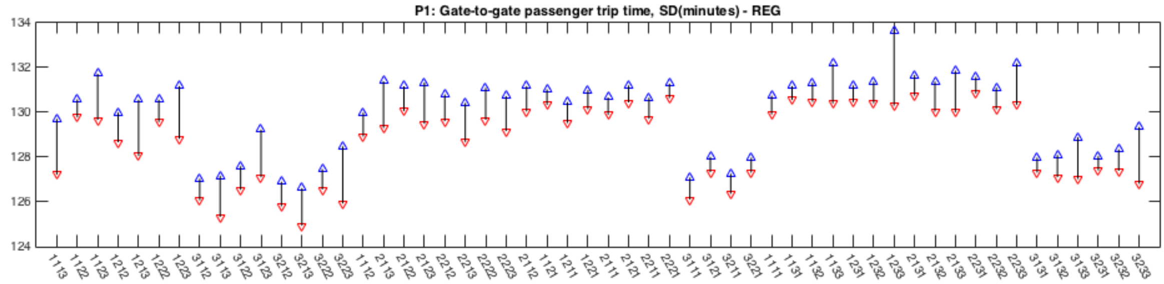

P1: Gate-to-gate passenger trip time, PERC95(minutes) - REG

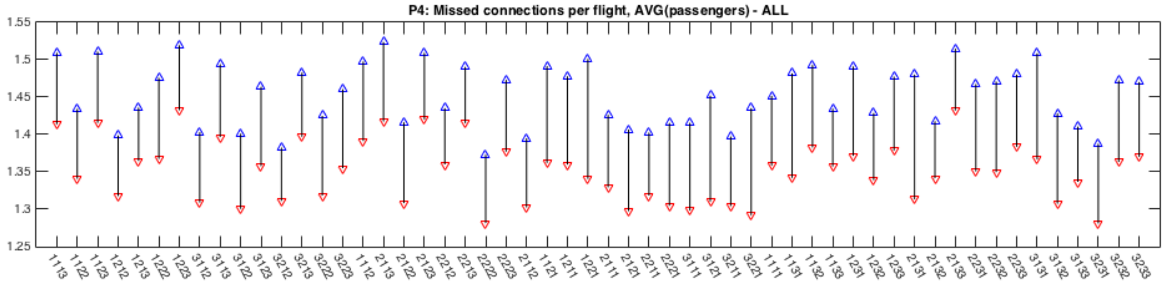

P1: Gate-to-gate passenger trip time, SD(minutes) - ALL

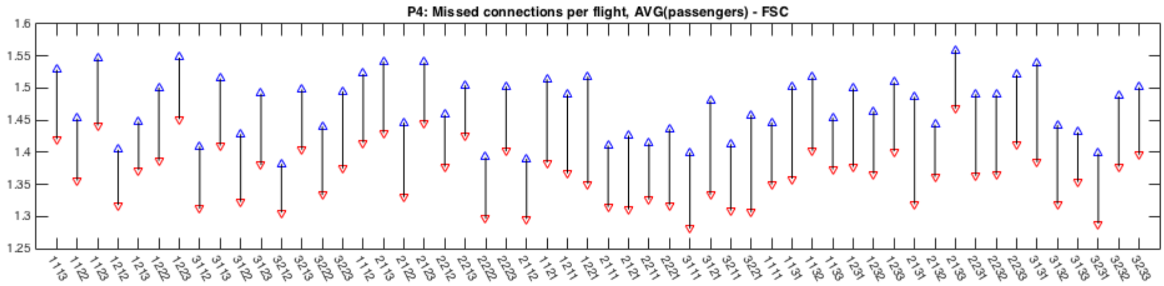

P1: Gate-to-gate passenger trip time, SD(minutes) - CHT

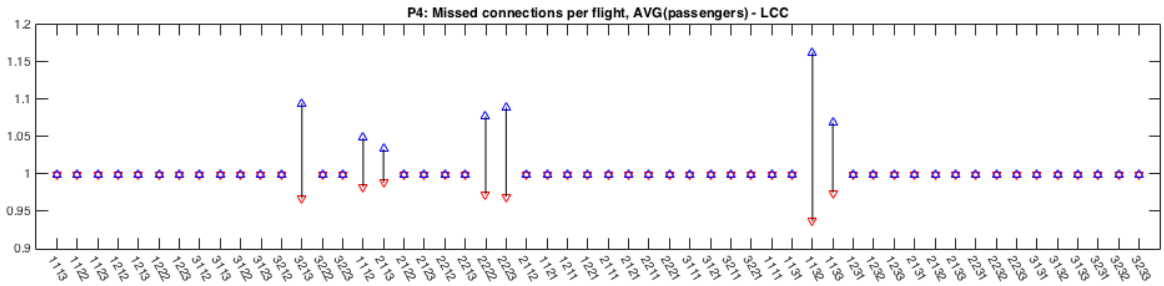

P1: Gate-to-gate passenger trip time, SD(minutes) - FSC

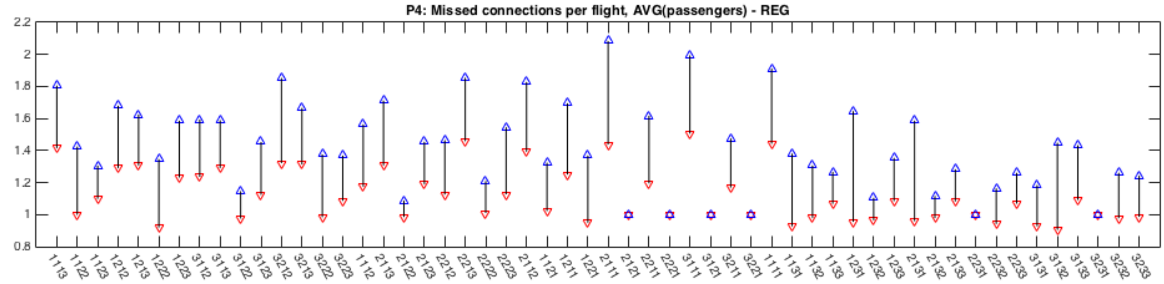

P1: Gate-to-gate passenger trip time, SD(minutes) - LCC

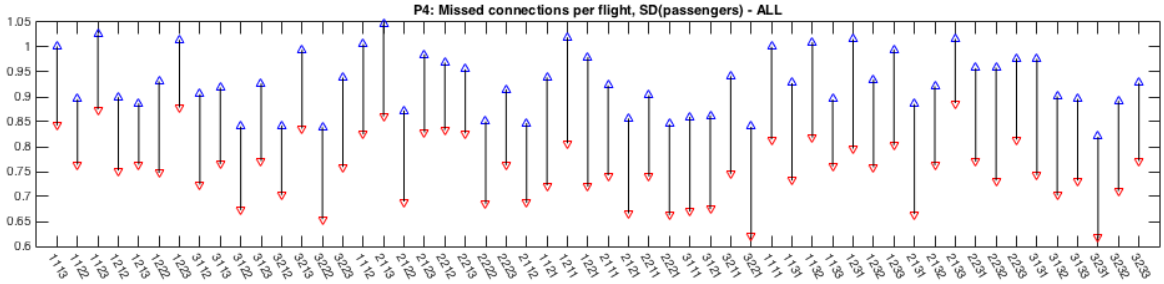

P1: Gate-to-gate passenger trip time, SD(minutes) - REG

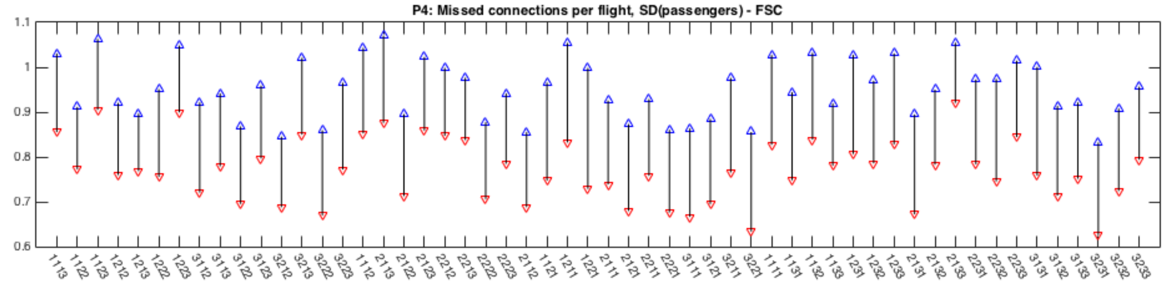

P4: Missed connections per flight, AVG(passengers) - ALL

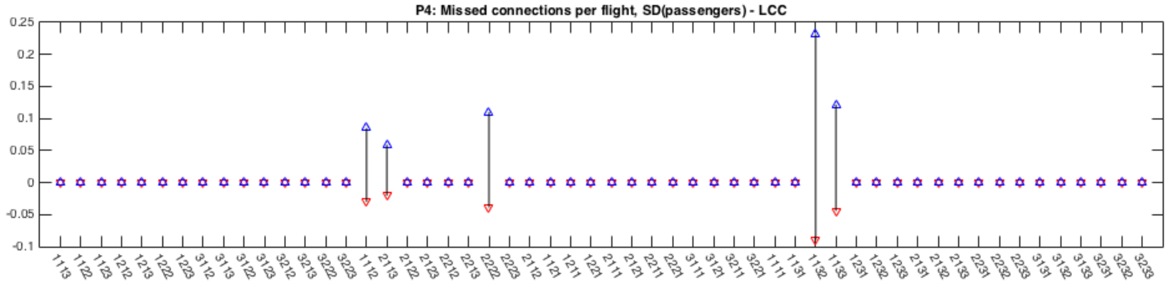

P4: Missed connections per flight, AVG(passengers) - FSC

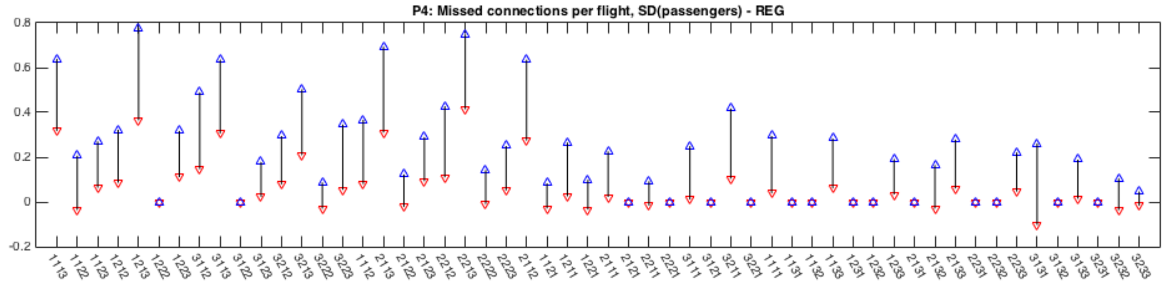

P4: Missed connections per flight, AVG(passengers) - LCC

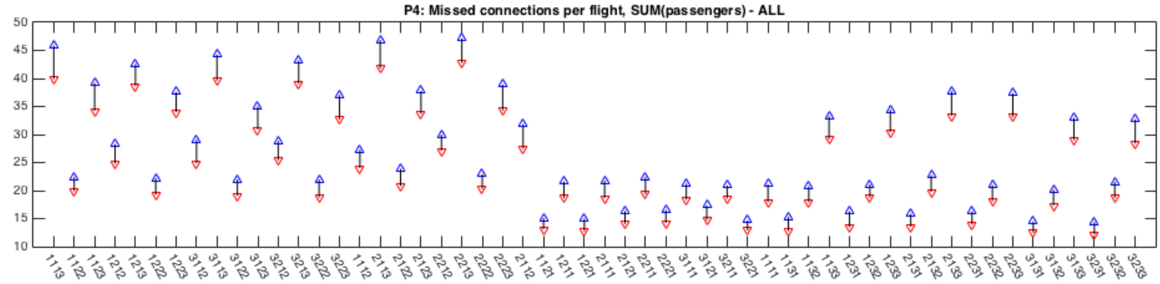

P4: Missed connections per flight, AVG(passengers) - REG

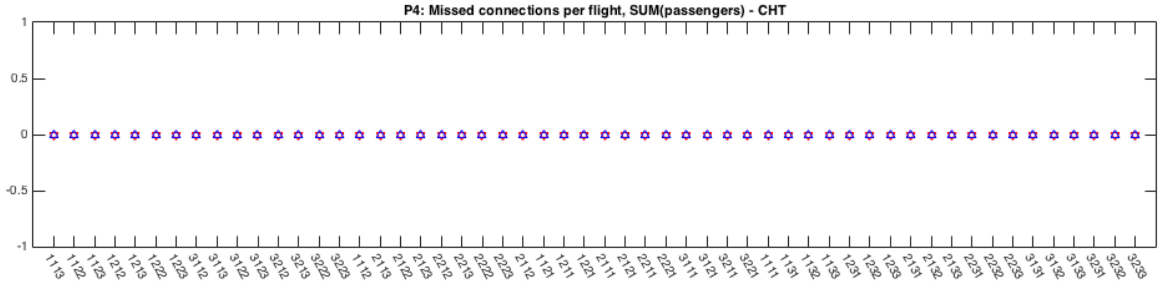

P4: Missed connections per flight, SD(passengers) - ALL

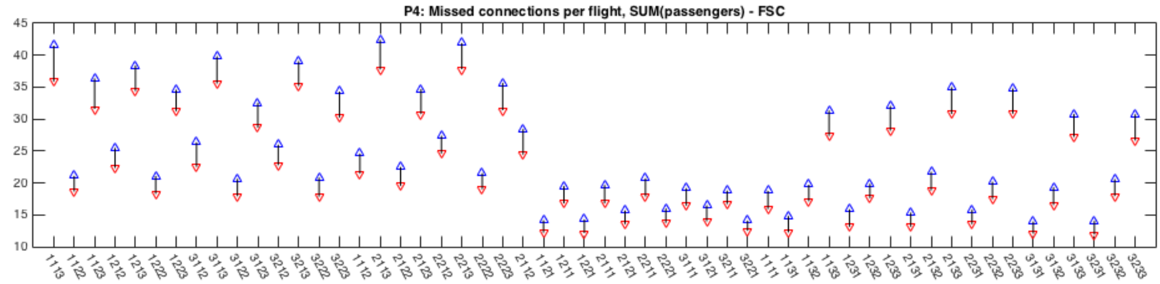

P4: Missed connections per flight, SD(passengers) - FSC

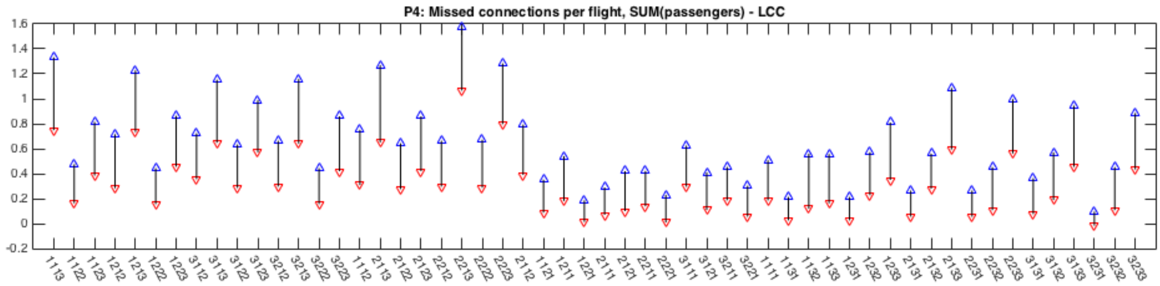

P4: Missed connections per flight, SD(passengers) - LCC

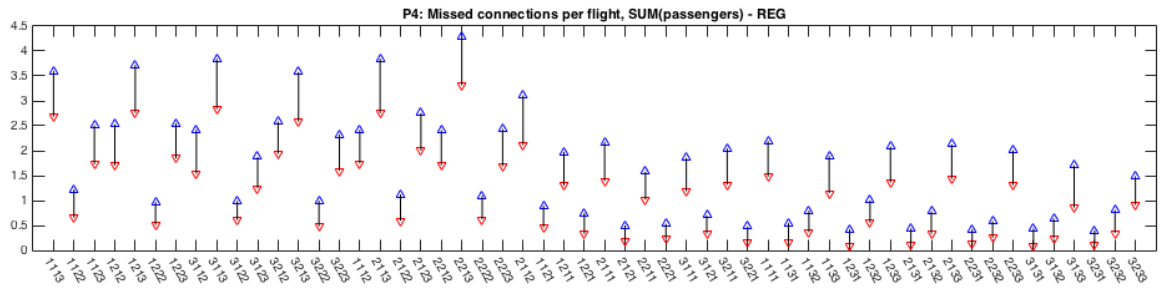

P4: Missed connections per flight, SD(passengers) - REG

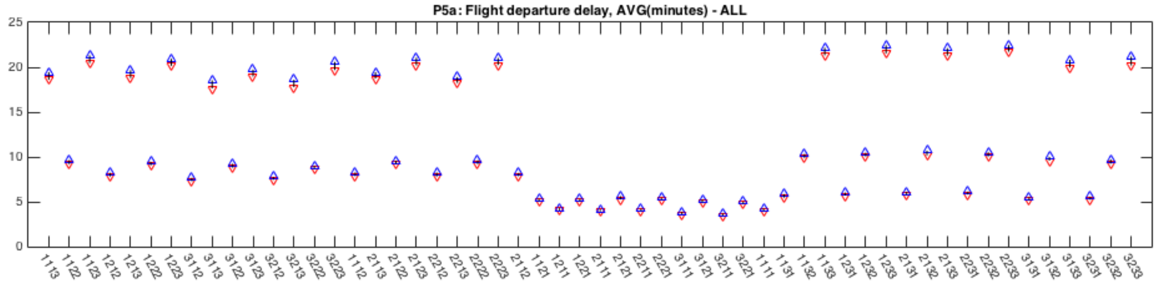

P4: Missed connections per flight, SUM(passengers) - ALL

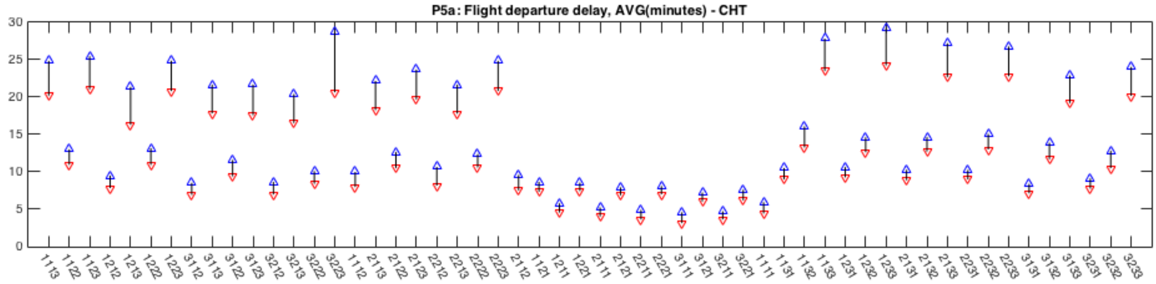

P4: Missed connections per flight, SUM(passengers) - CHT

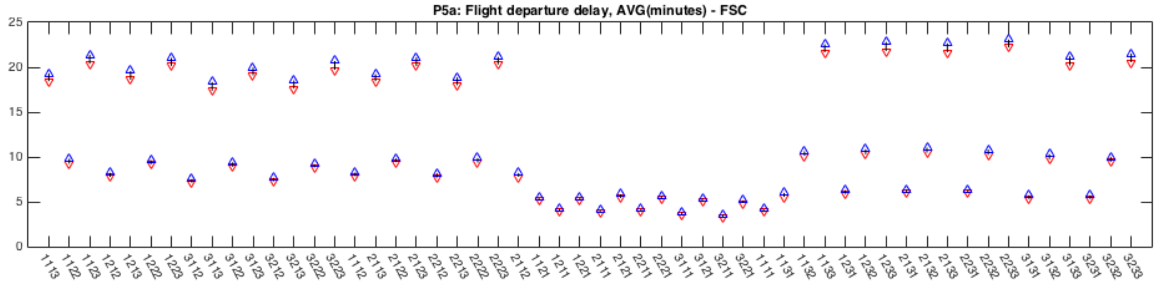

P4: Missed connections per flight, SUM(passengers) - FSC

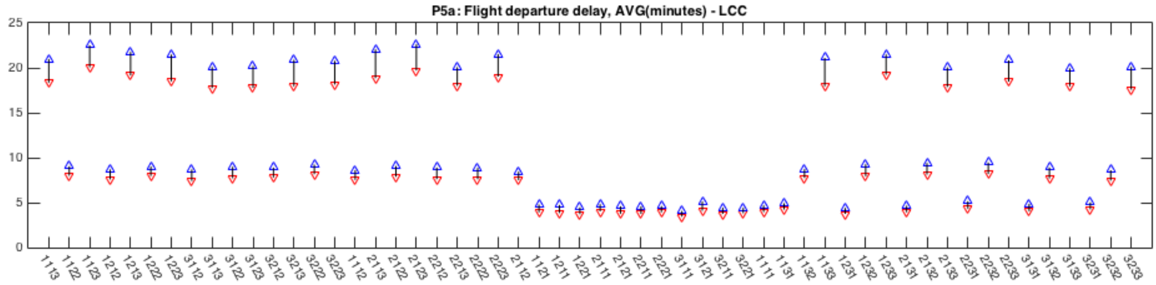

P4: Missed connections per flight, SUM(passengers) - LCC

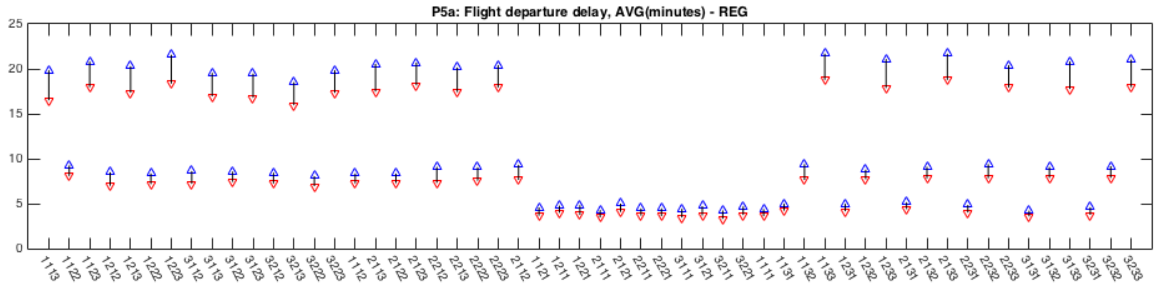

P4: Missed connections per flight, SUM(passengers) - REG

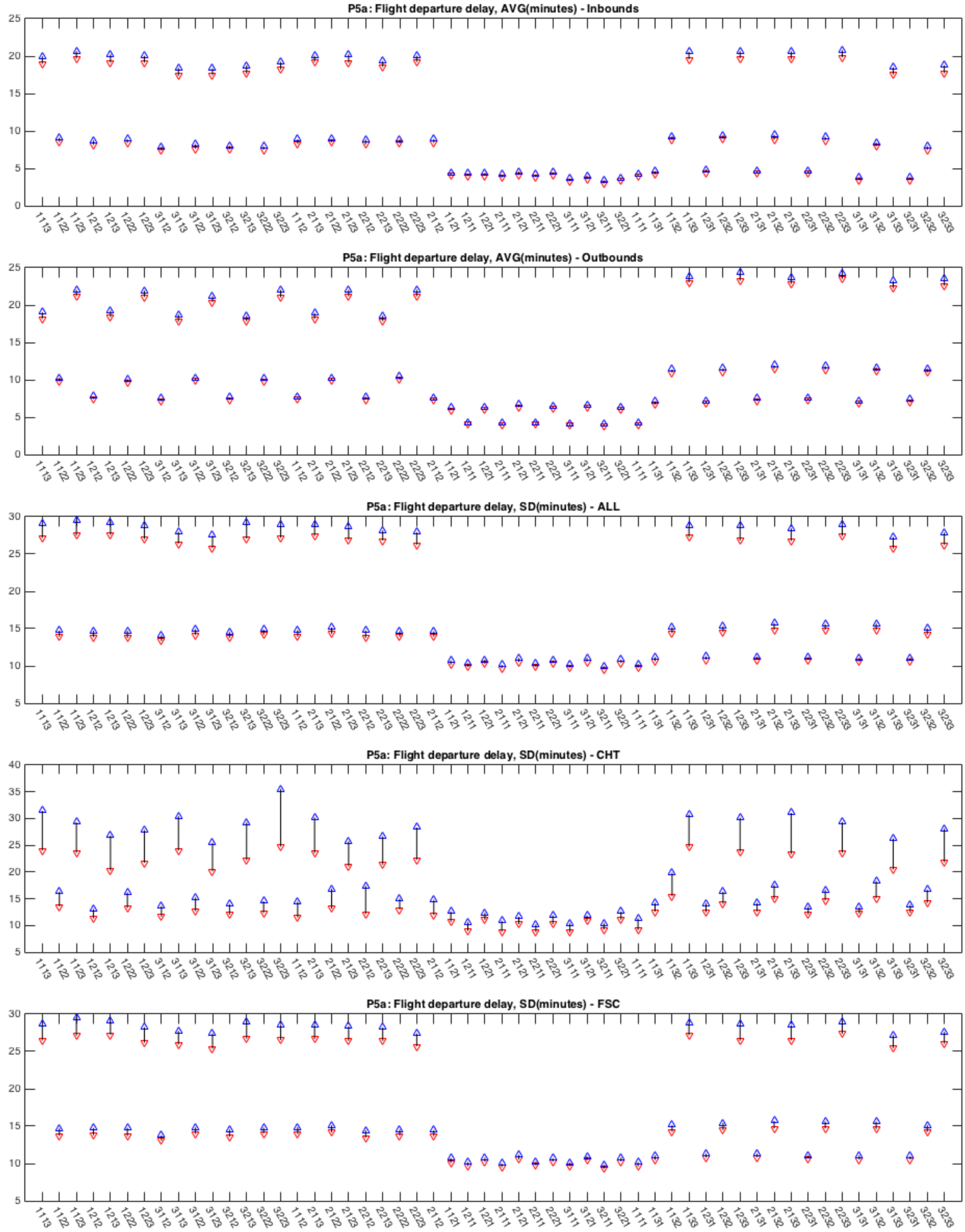

P5a: Flight departure delay, AVG(minutes) - ALL

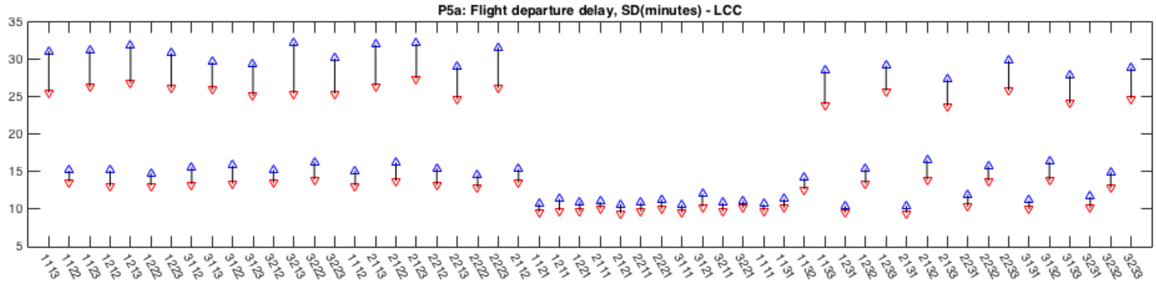

P5a: Flight departure delay, AVG(minutes) - CHT

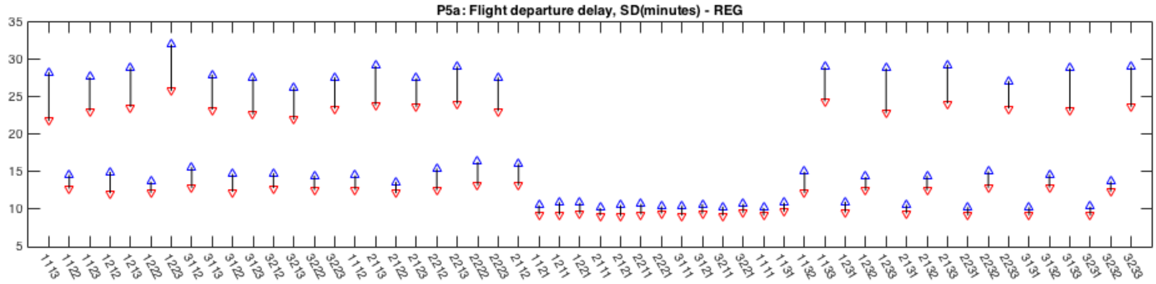

P5a: Flight departure delay, AVG(minutes) - FSC

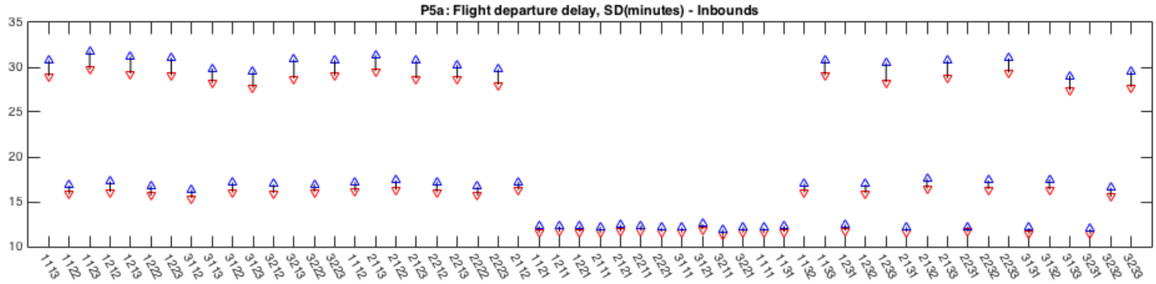

P5a: Flight departure delay, AVG(minutes) - LCC

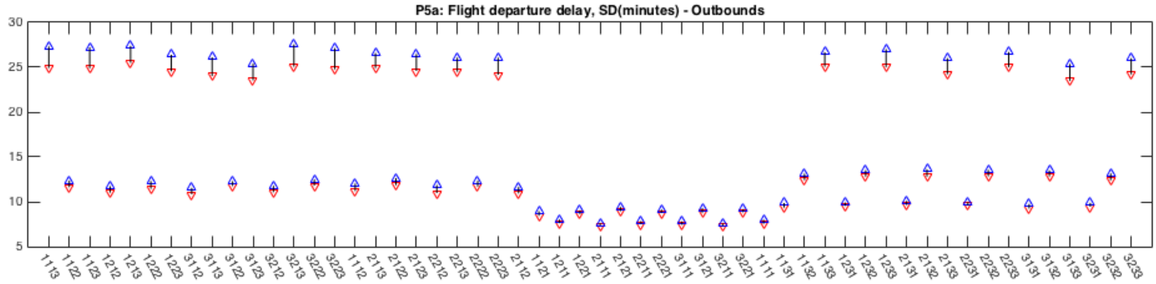

P5a: Flight departure delay, AVG(minutes) - REG

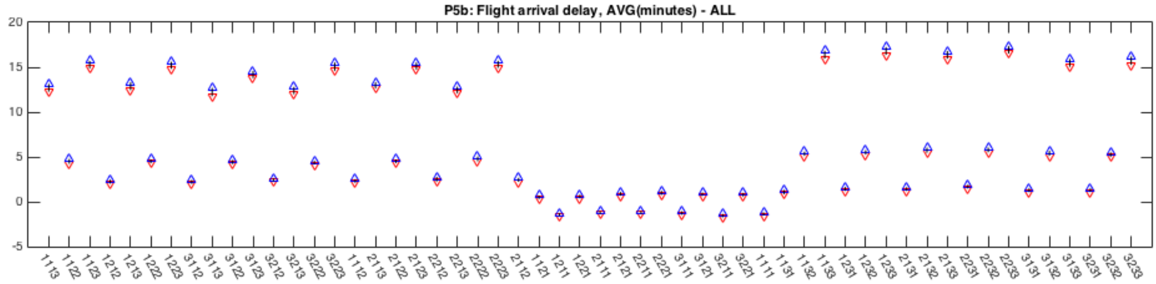

P5a: Flight departure delay, AVG(minutes) - Inbounds
P5a: Flight departure delay, AVG(minutes) - Outbounds
P5a: Flight departure delay, SD(minutes) - ALL
P5a: Flight departure delay, SD(minutes) - CHT
P5a: Flight departure delay, SD(minutes) - FSC

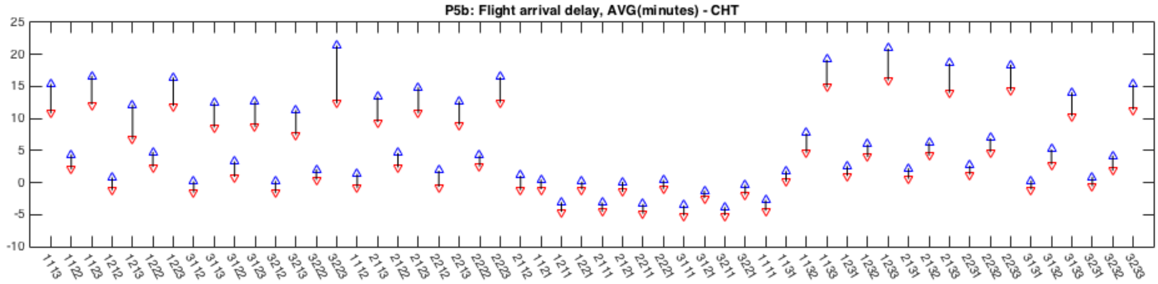

P5a: Flight departure delay, SD(minutes) - LCC

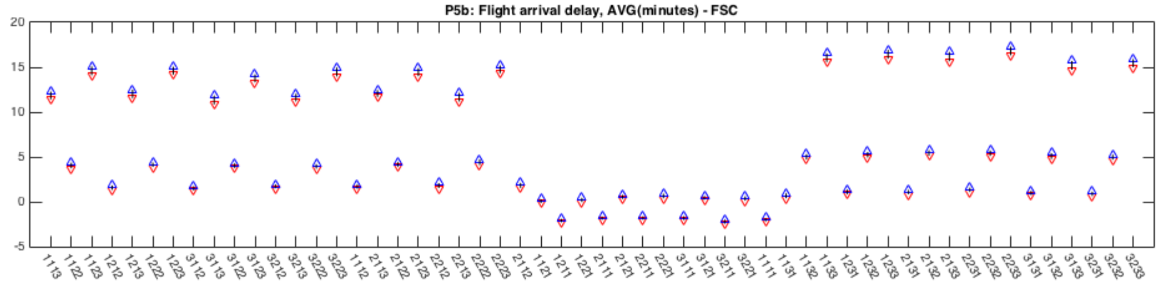

P5a: Flight departure delay, SD(minutes) - REG

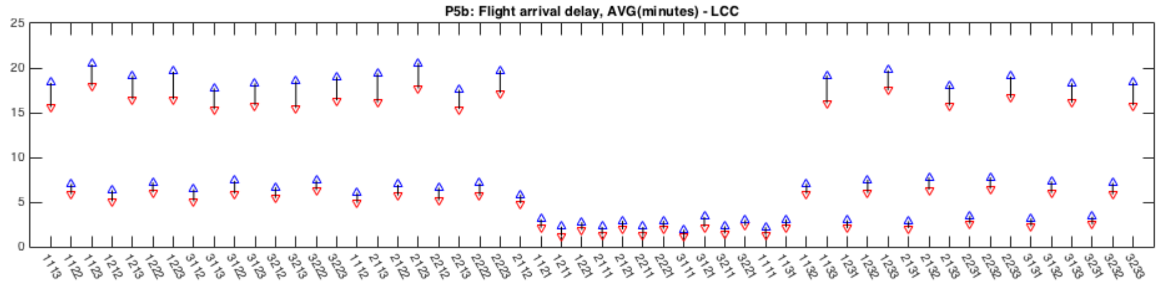

P5a: Flight departure delay, SD(minutes) - Inbounds

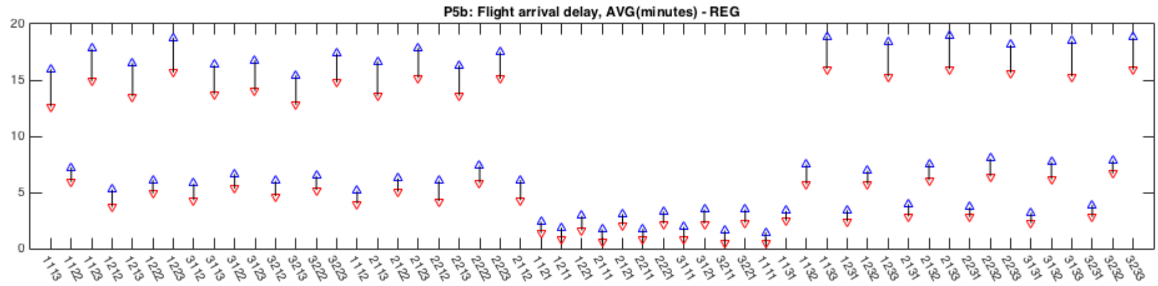

P5a: Flight departure delay, SD(minutes) - Outbounds

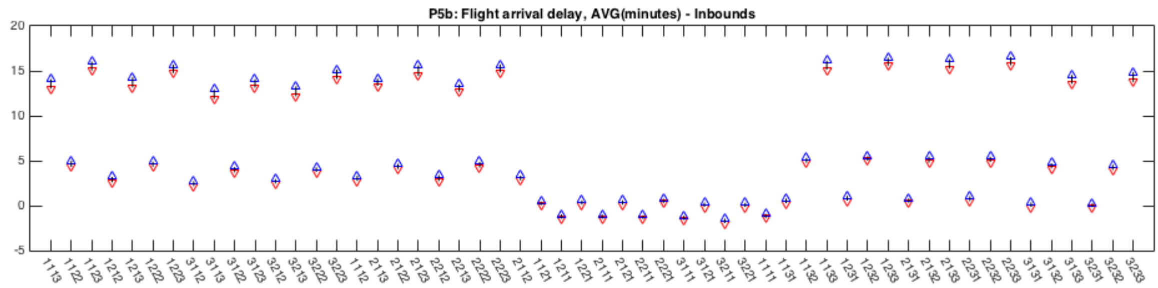

P5b: Flight arrival delay, AVG(minutes) - ALL

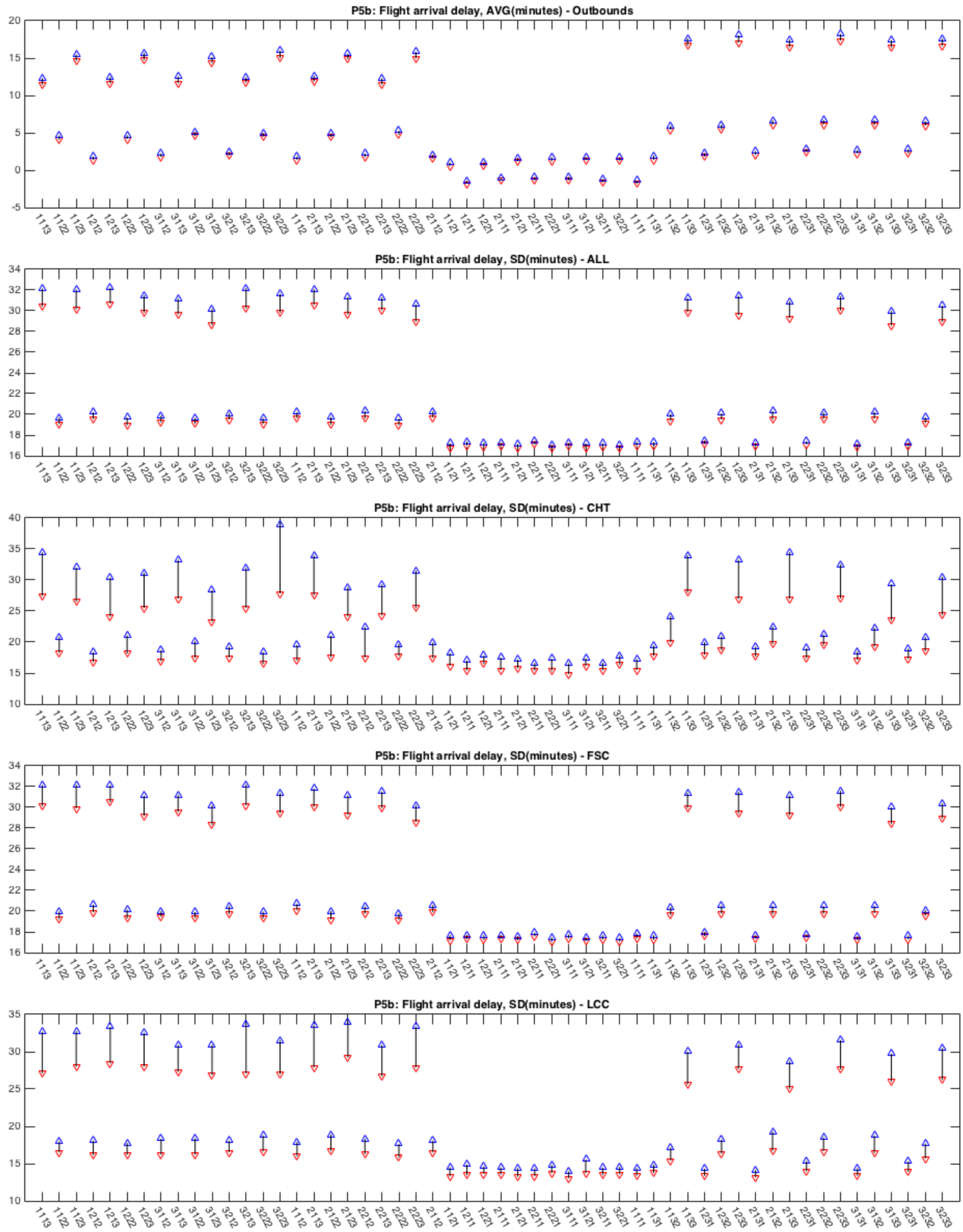

P5b: Flight arrival delay, AVG(minutes) - CHT

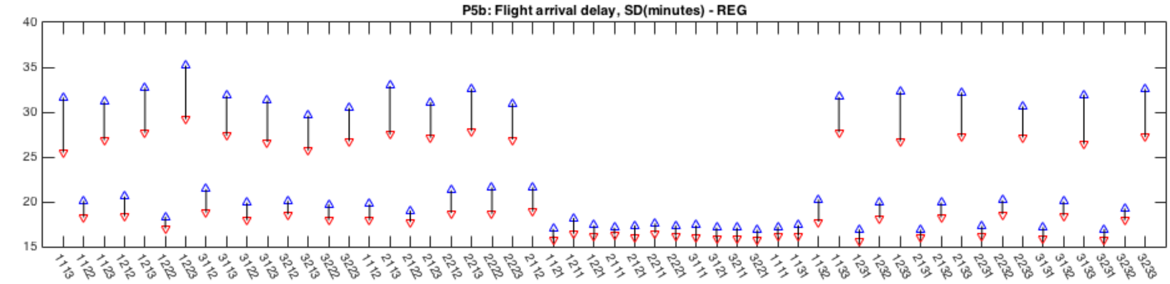

P5b: Flight arrival delay, AVG(minutes) - FSC

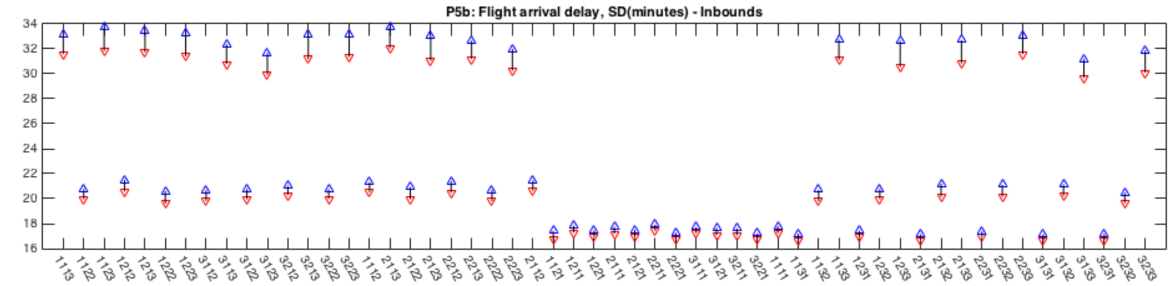

P5b: Flight arrival delay, AVG(minutes) - LCC

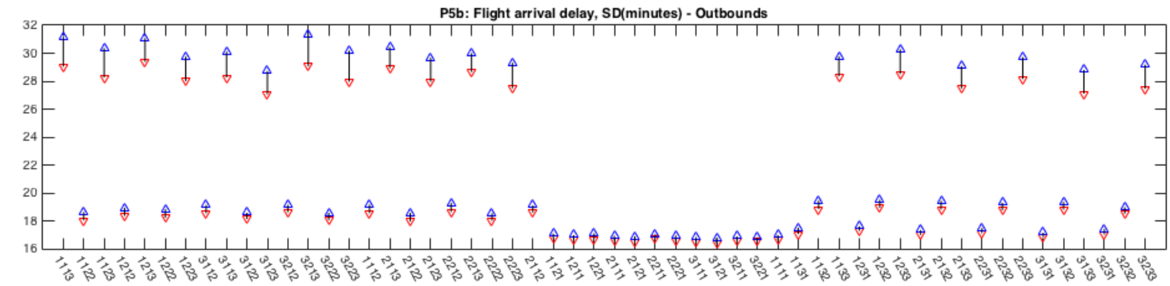

P5b: Flight arrival delay, AVG(minutes) - REG

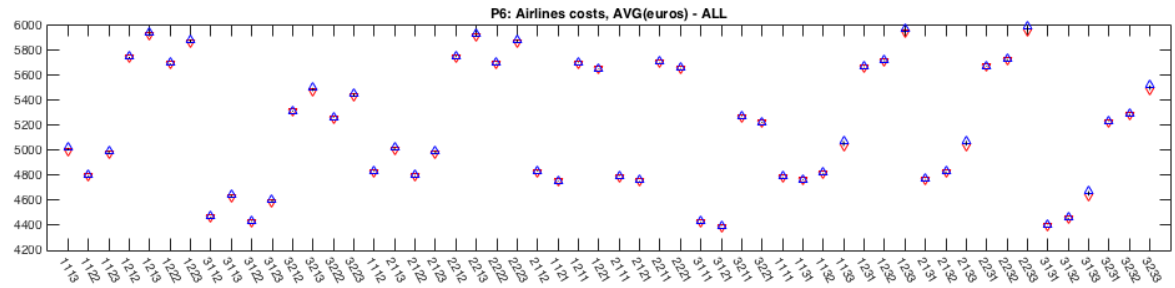

P5b: Flight arrival delay, AVG(minutes) - Inbounds

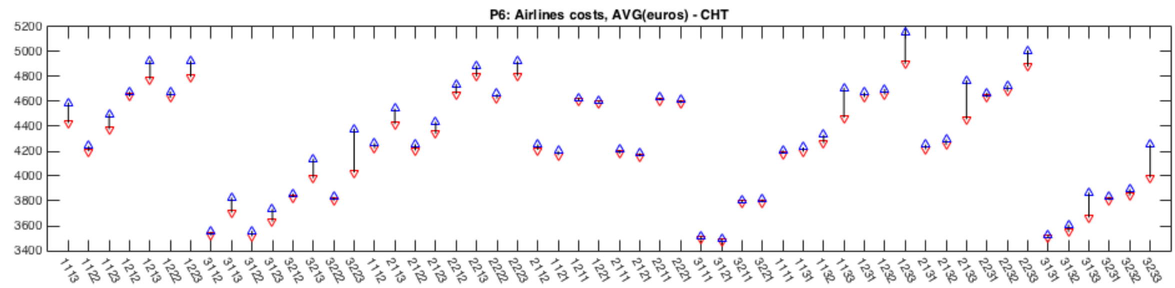

P5b: Flight arrival delay, AVG(minutes) - Outbounds
P5b: Flight arrival delay, SD(minutes) - ALL
P5b: Flight arrival delay, SD(minutes) - CHT
P5b: Flight arrival delay, SD(minutes) - FSC
P5b: Flight arrival delay, SD(minutes) - LCC

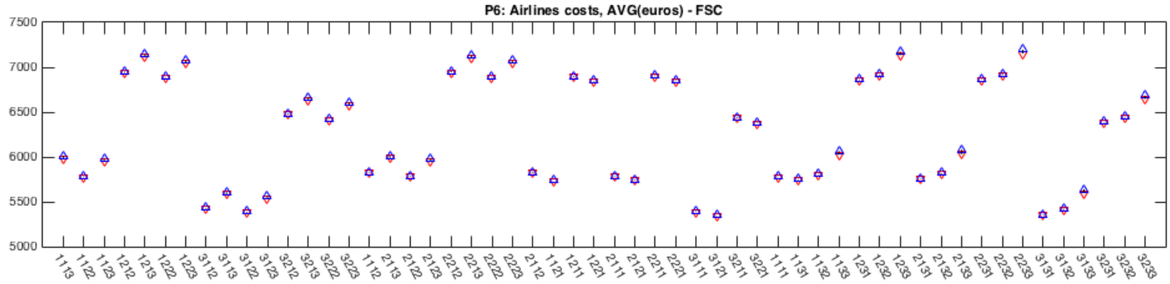

P5b: Flight arrival delay, SD(minutes) - REG

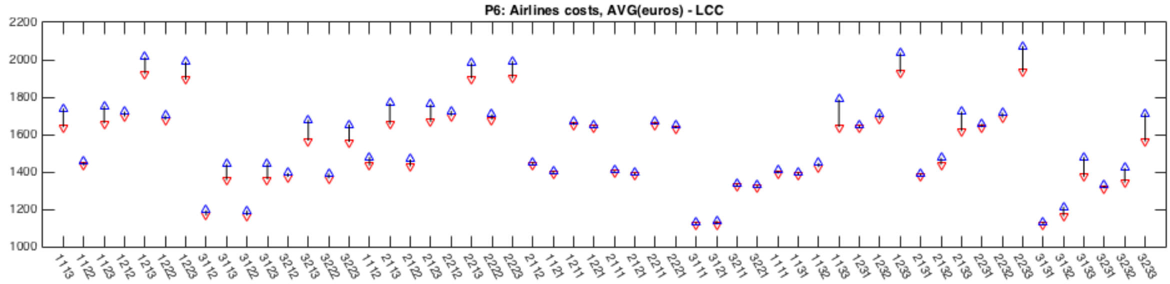

P5b: Flight arrival delay, SD(minutes) - Inbounds

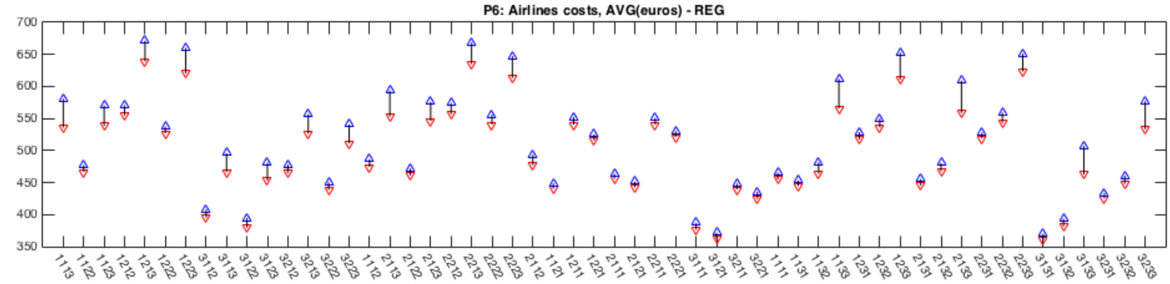

P5b: Flight arrival delay, SD(minutes) - Outbounds

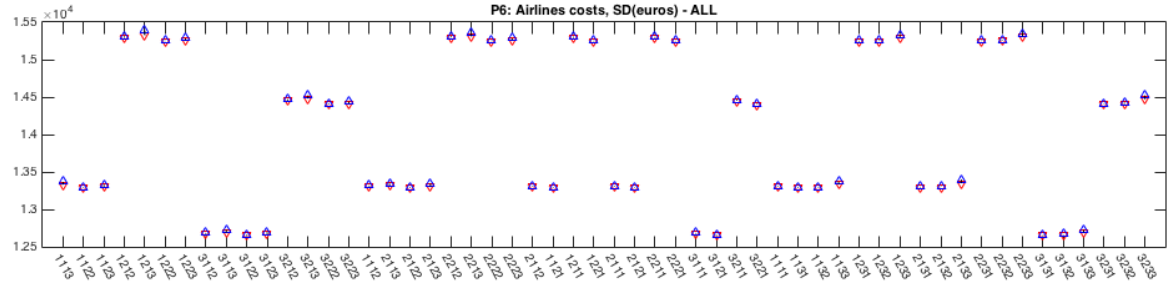

P6: Airlines costs, AVG(euros) - ALL

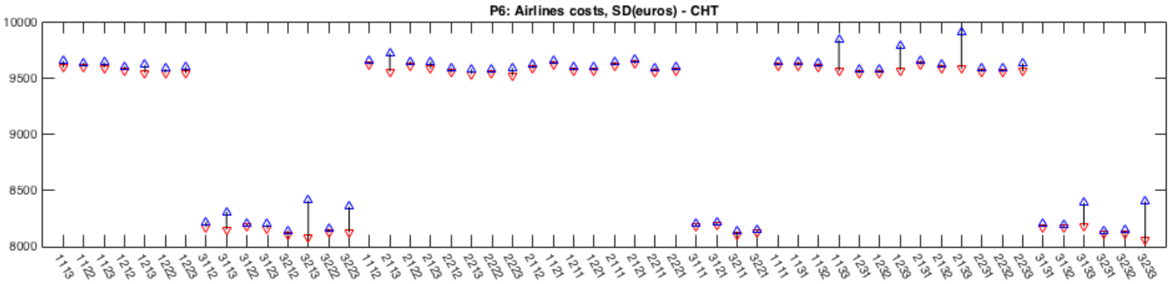

P6: Airlines costs, AVG(euros) - CHT

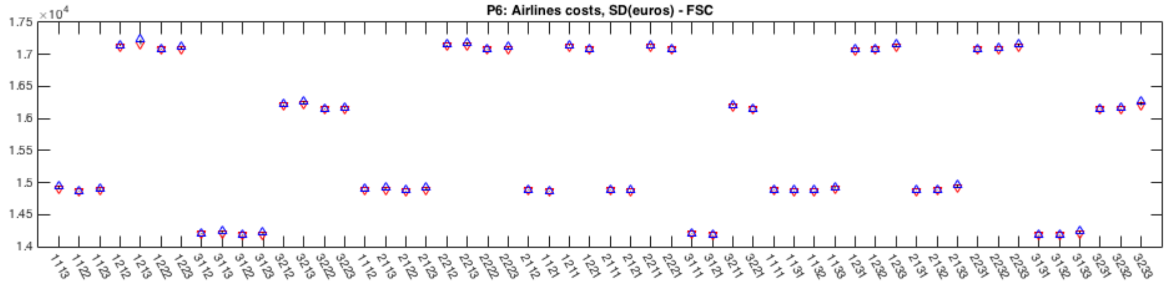

P6: Airlines costs, AVG(euros) - FSC

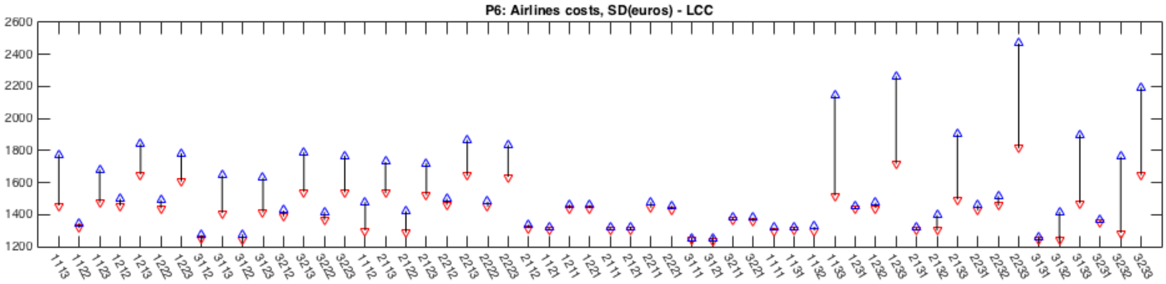

P6: Airlines costs, AVG(euros) - LCC

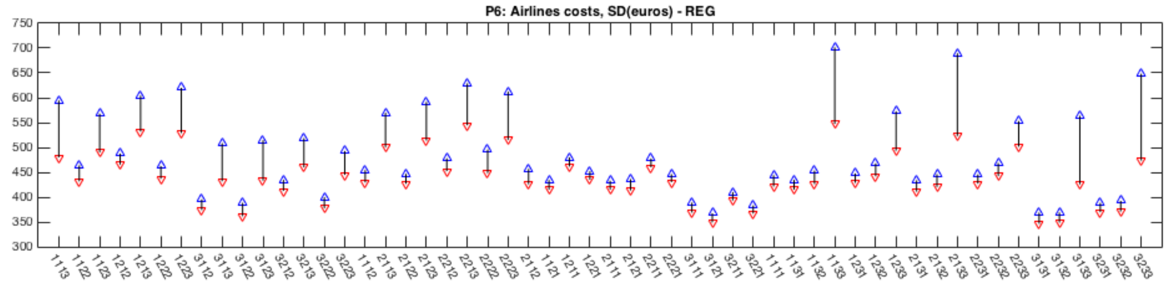

P6: Airlines costs, AVG(euros) - REG

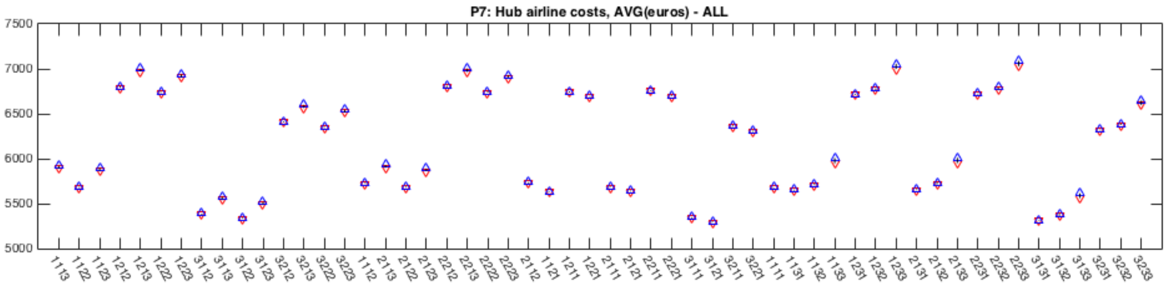

P6: Airlines costs, SD(euros) - ALL

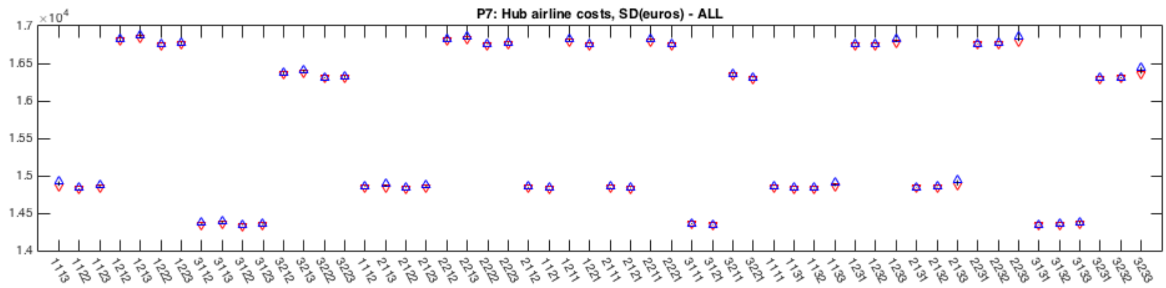

P6: Airlines costs, SD(euros) - CHT

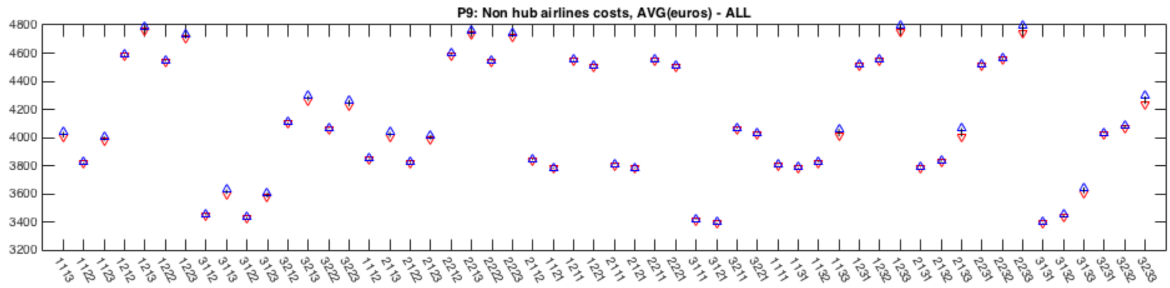

P6: Airlines costs, SD(euros) - FSC

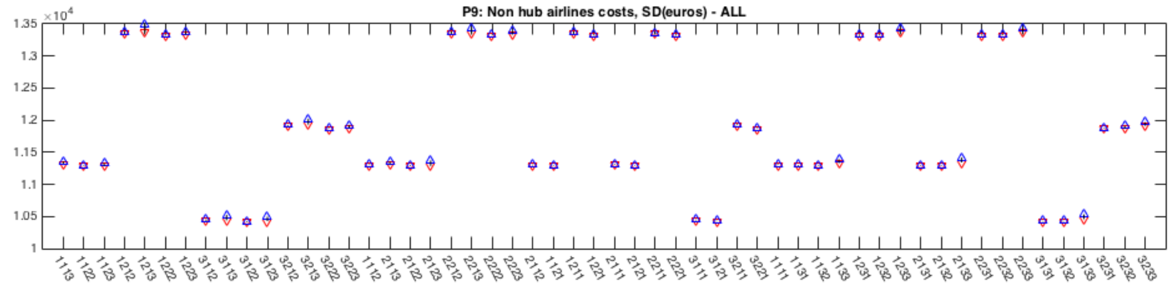

P6: Airlines costs, SD(euros) - LCC

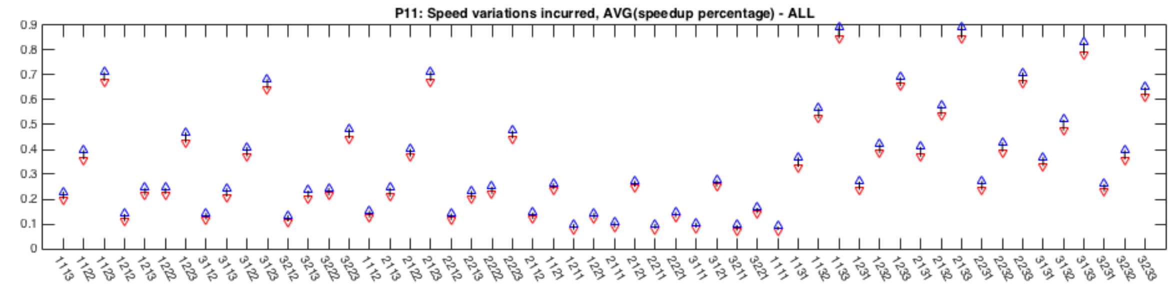

P6: Airlines costs, SD(euros) - REG

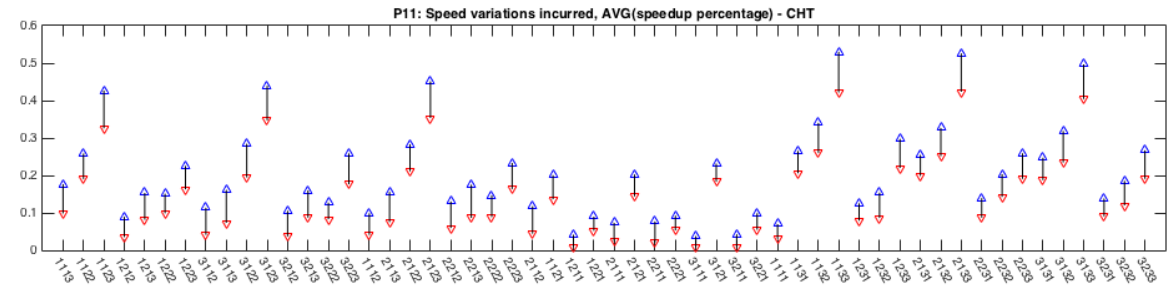

P7: Hub airline costs, AVG(euros) - ALL

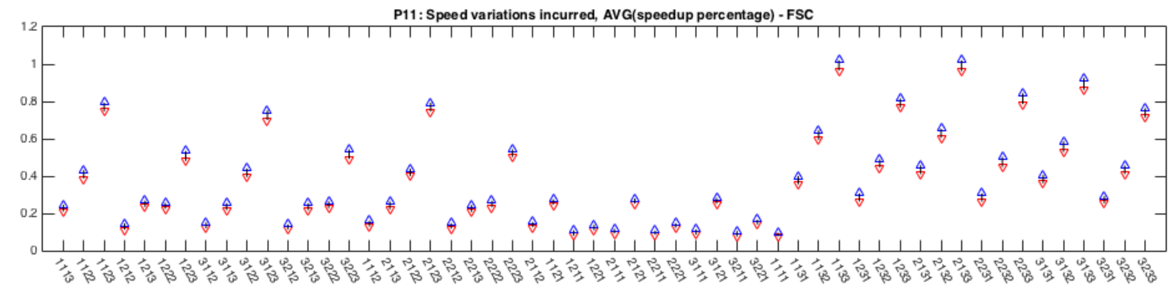

P7: Hub airline costs, SD(euros) - ALL

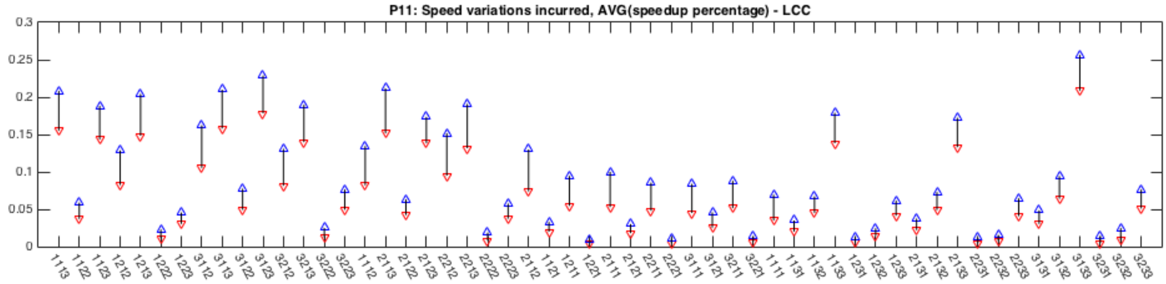

P9: Non hub airlines costs, AVG(euros) - ALL

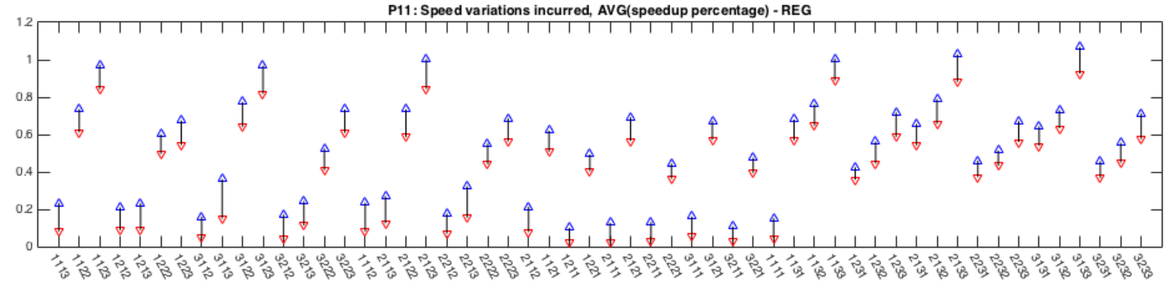

P9: Non hub airlines costs, SD(euros) - ALL

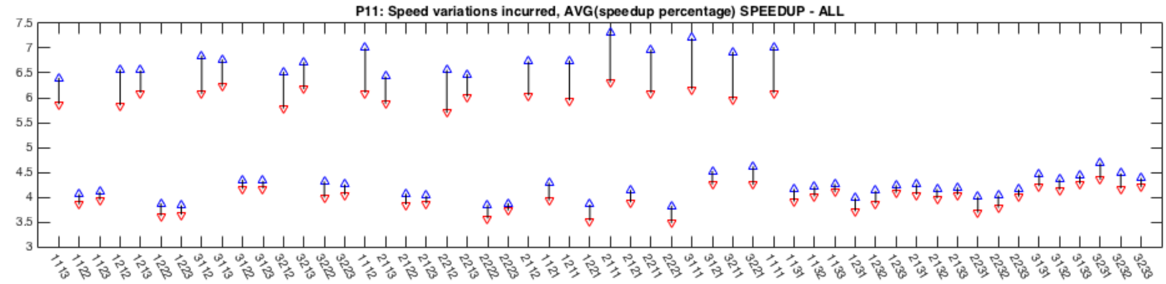

P11: Speed variations incurred, AVG(speedup percentage) - ALL

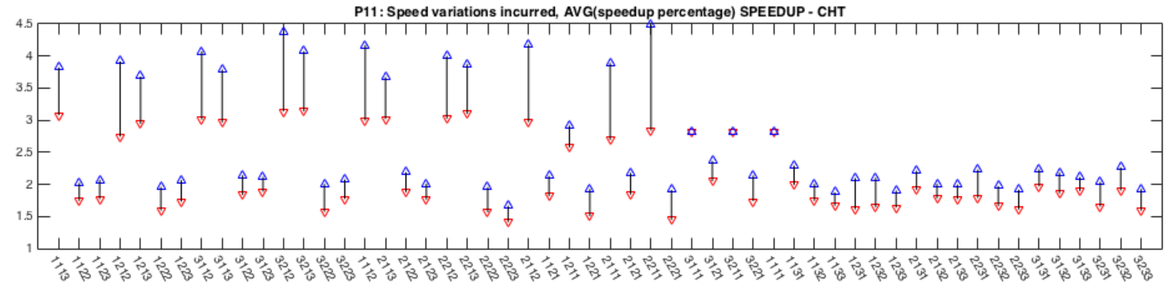

P11: Speed variations incurred, AVG(speedup percentage) - CHT

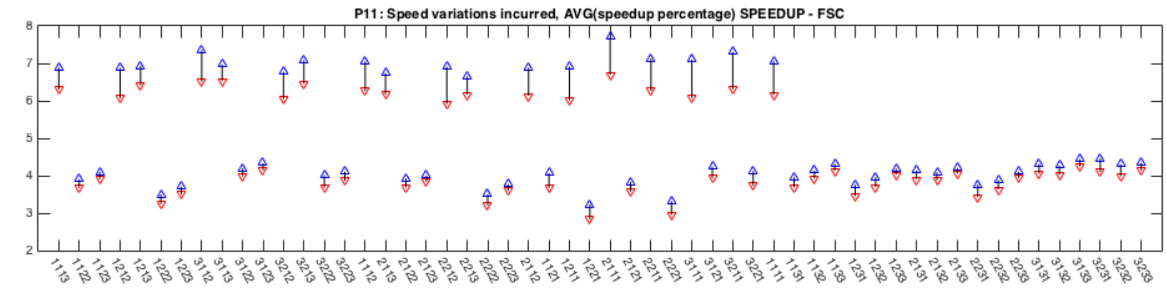

P11: Speed variations incurred, AVG(speedup percentage) - FSC

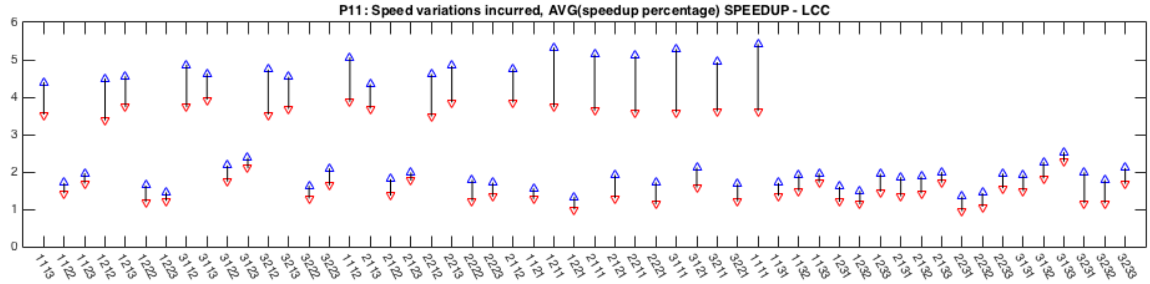

P11: Speed variations incurred, AVG(speedup percentage) - LCC

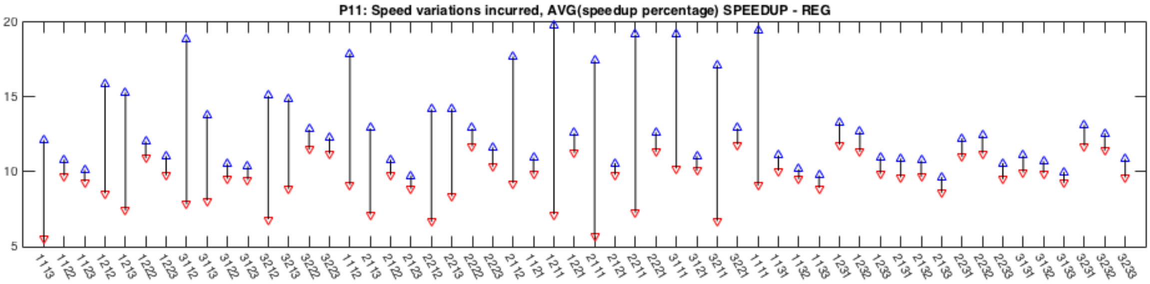

P11: Speed variations incurred, AVG(speedup percentage) - REG

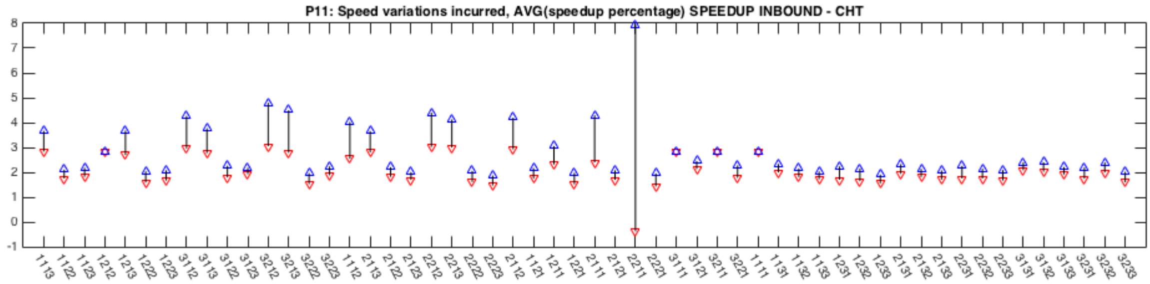

P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP - ALL

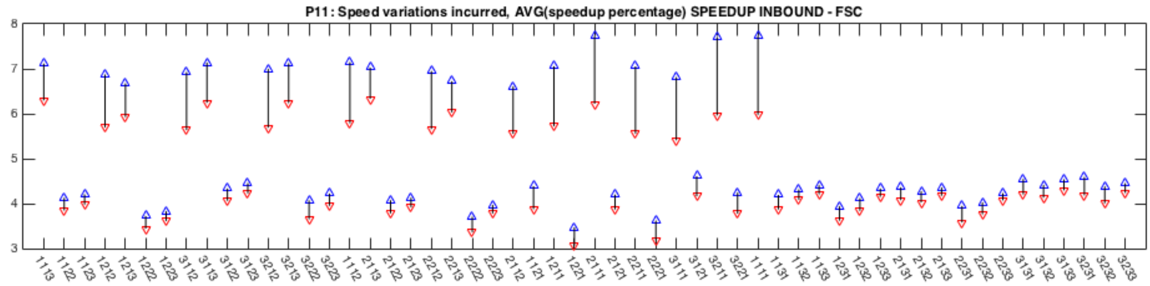

P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP - CHT

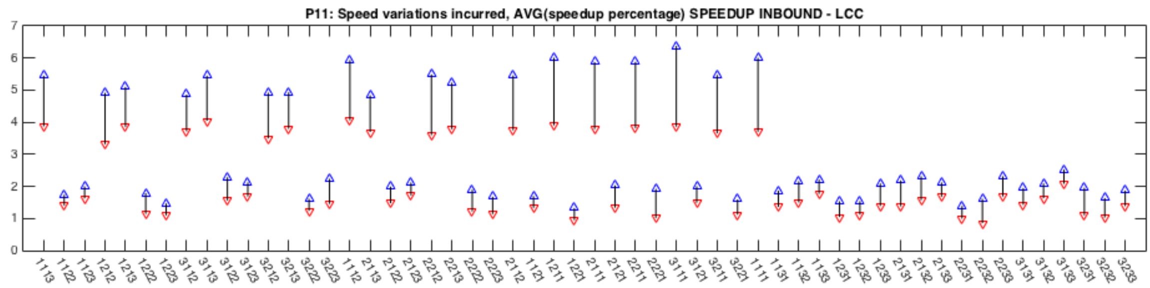

P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP - FSC


P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP - LCC


P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP - REG


P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP INBOUND - CHT


P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP INBOUND - FSC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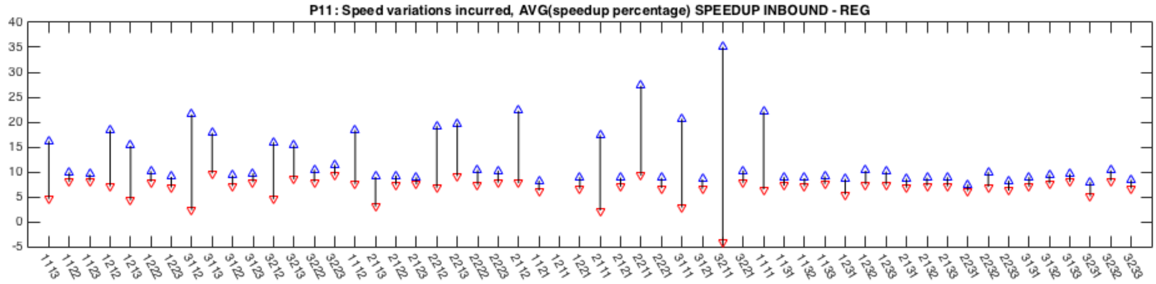
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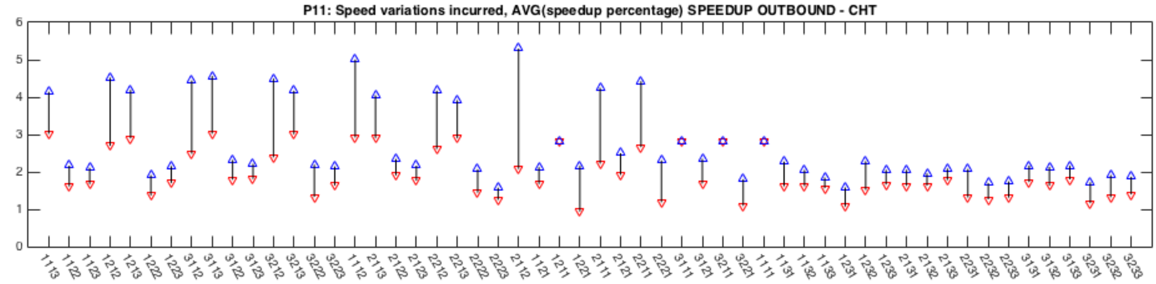
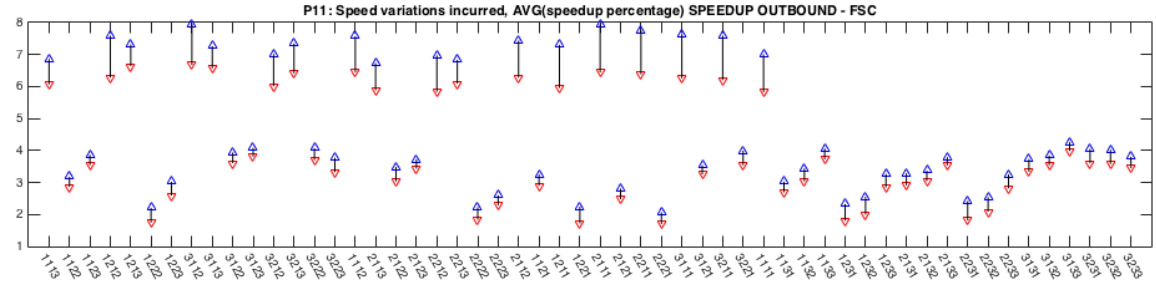

P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP OUTBOUND - CHT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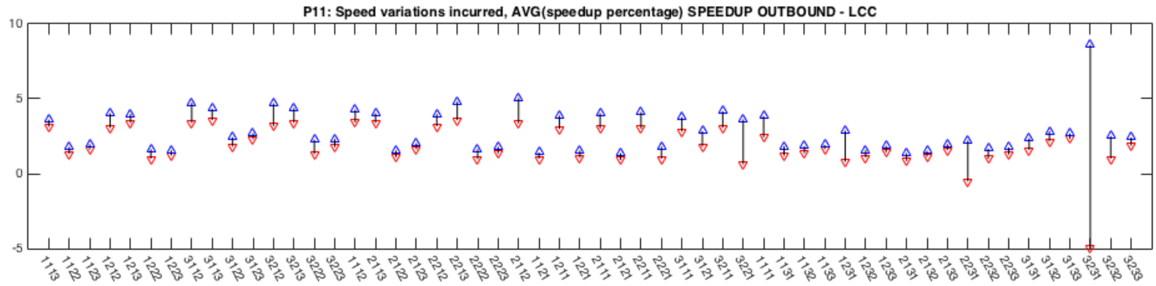
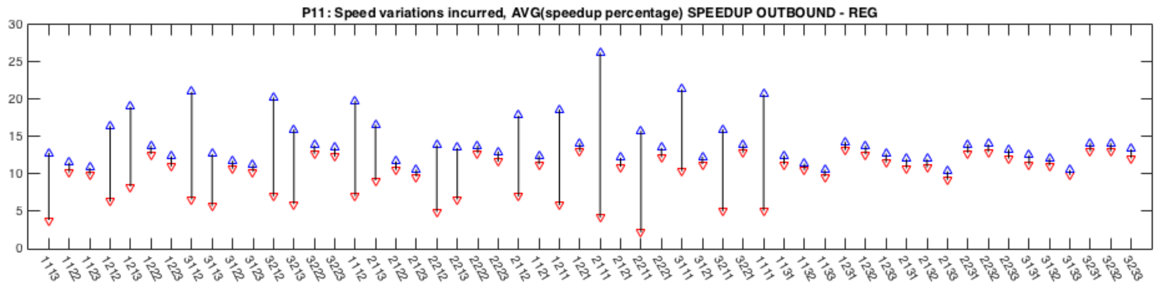
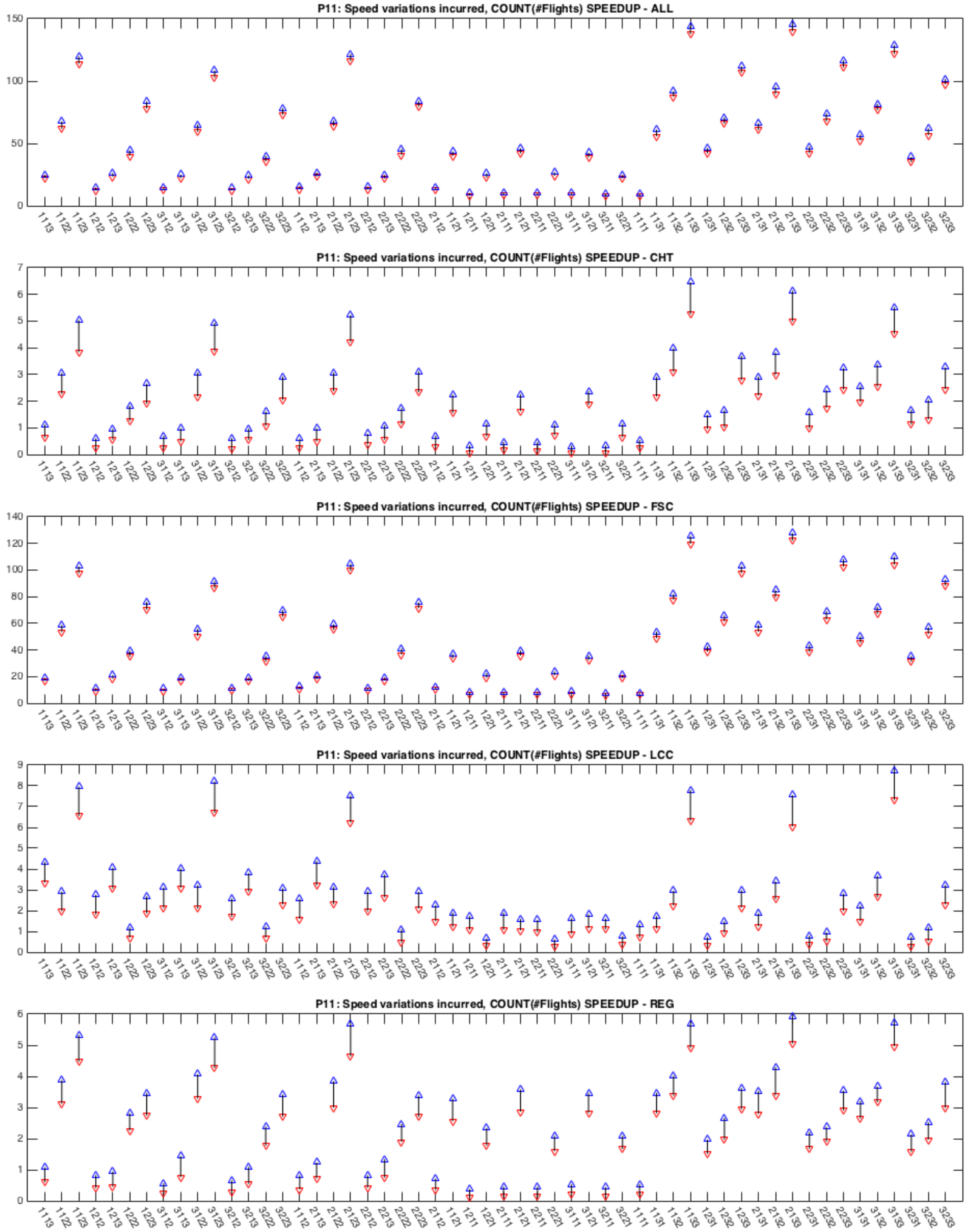

P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP OUTBOUND - LCC


P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP OUTBOUND - REG


P11: Speed variations incurred, COUNT(#Flights) SPEEDUP - ALL
P11: Speed variations incurred, COUNT(#Flights) SPEEDUP - CHT
P11: Speed variations incurred, COUNT(#Flights) SPEEDUP - FSC
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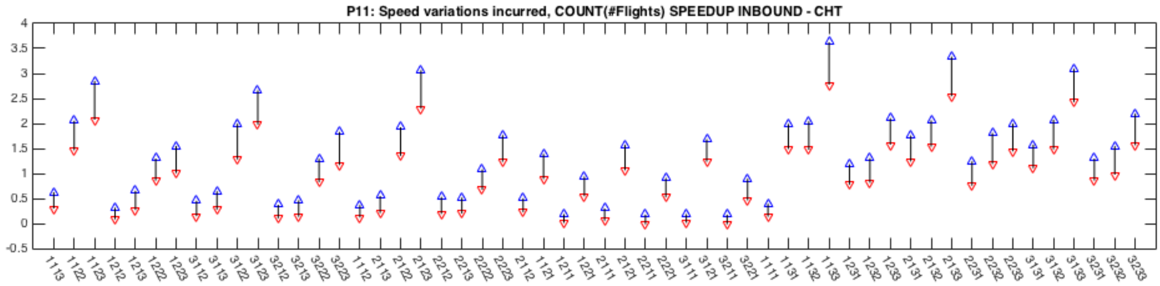
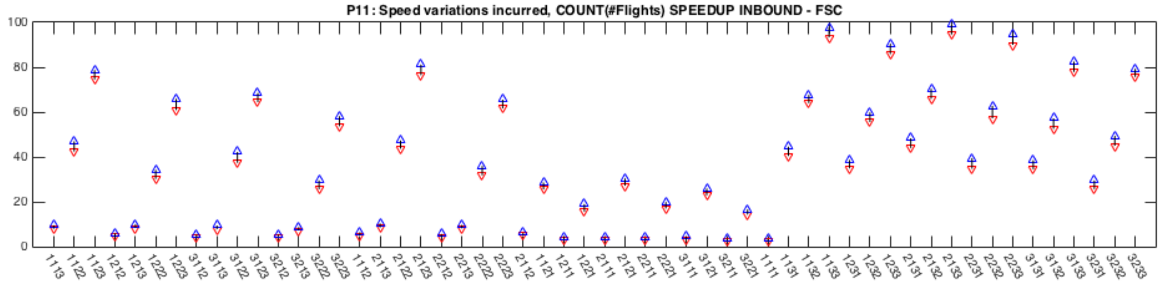
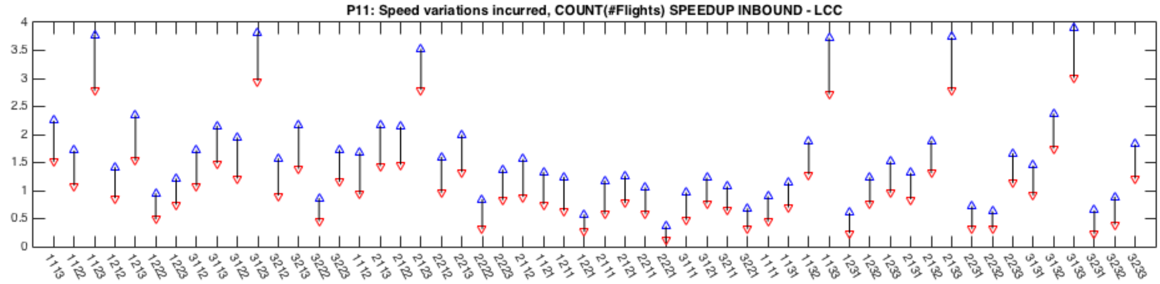
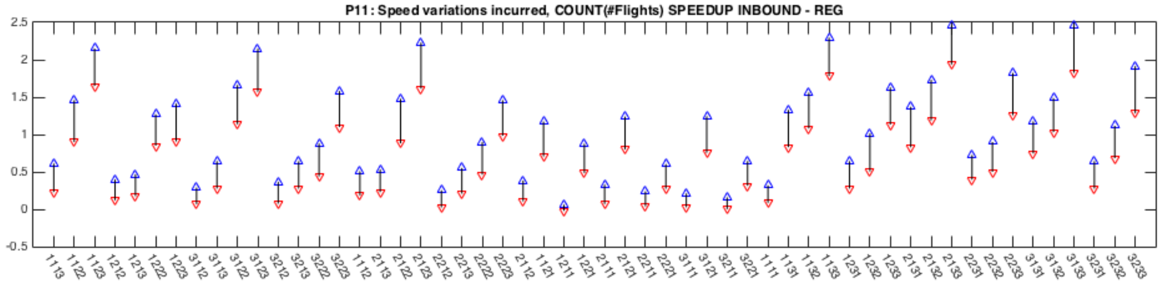
P11: Speed variations incurred, COUNT(#Flights) SPEEDUP - REG


P11: Speed variations incurred, COUNT(#Flights) SPEEDUP INBOUND - CHT


P11: Speed variations incurred, COUNT(#Flights) SPEEDUP INBOUND - FSC


P11: Speed variations incurred, COUNT(#Flights) SPEEDUP INBOUND - LCC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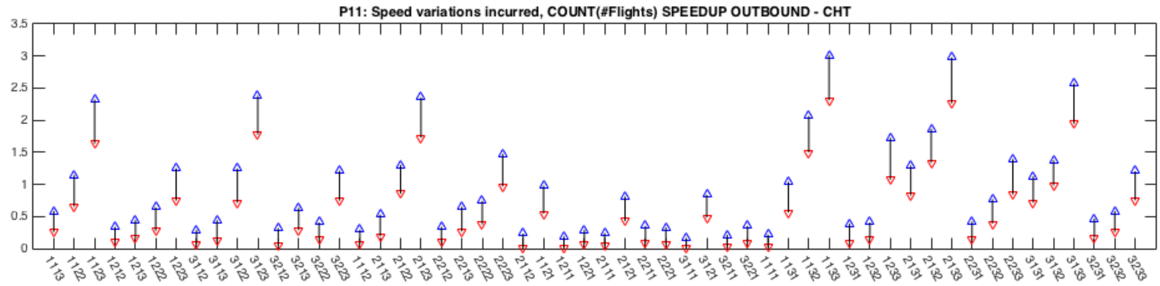
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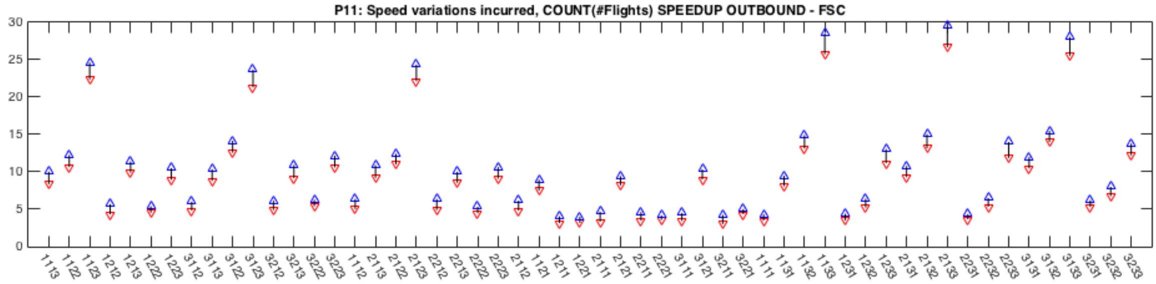
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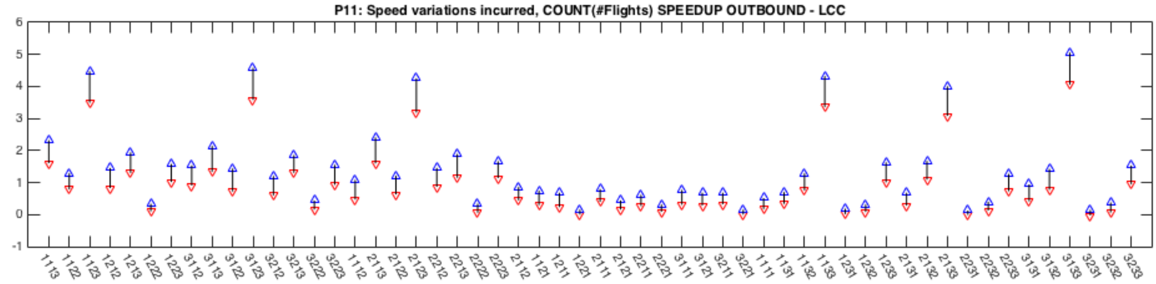
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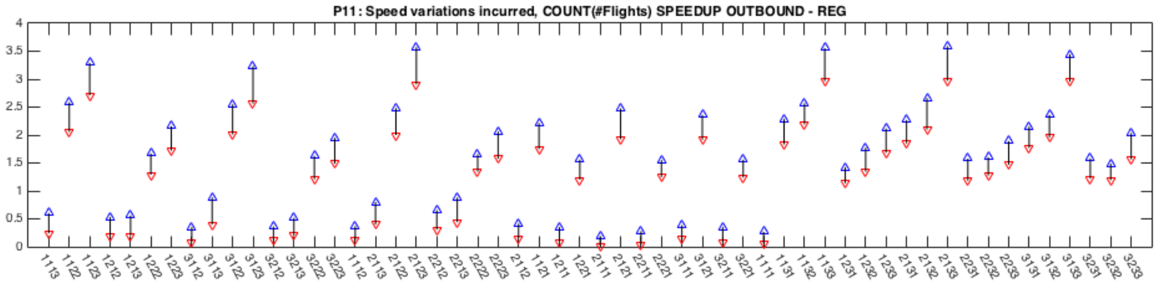
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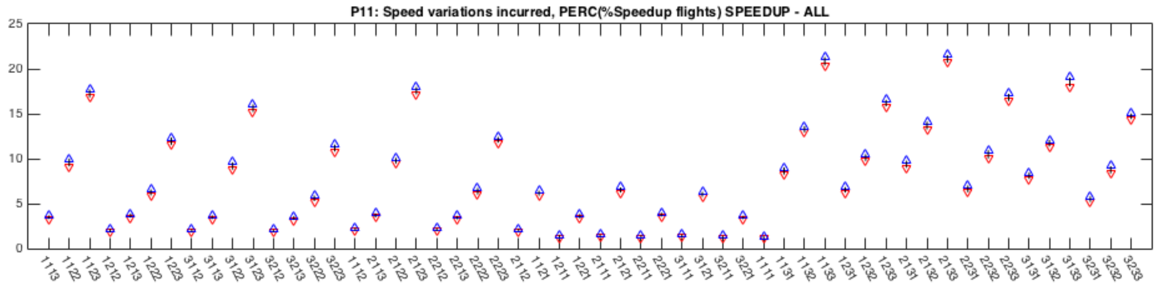
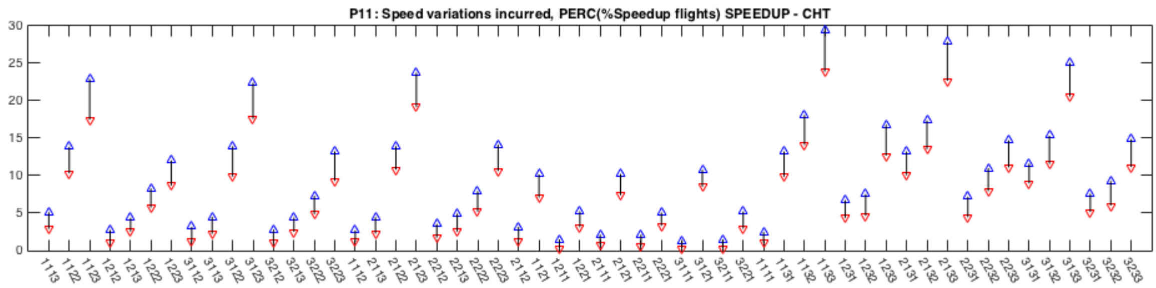
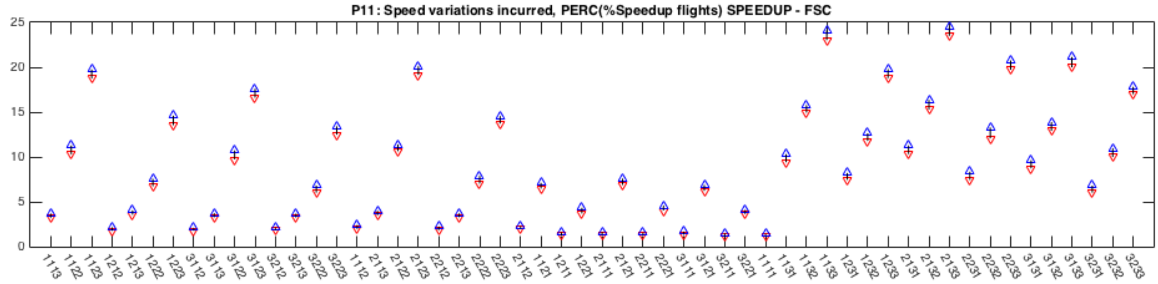

P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP - ALL


P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP - CHT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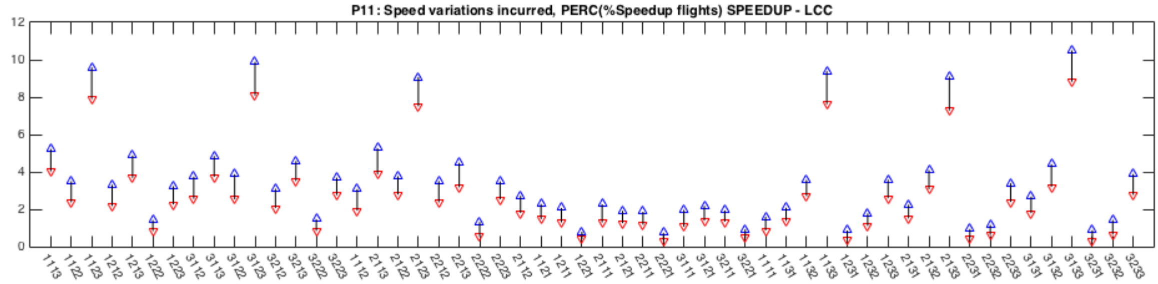
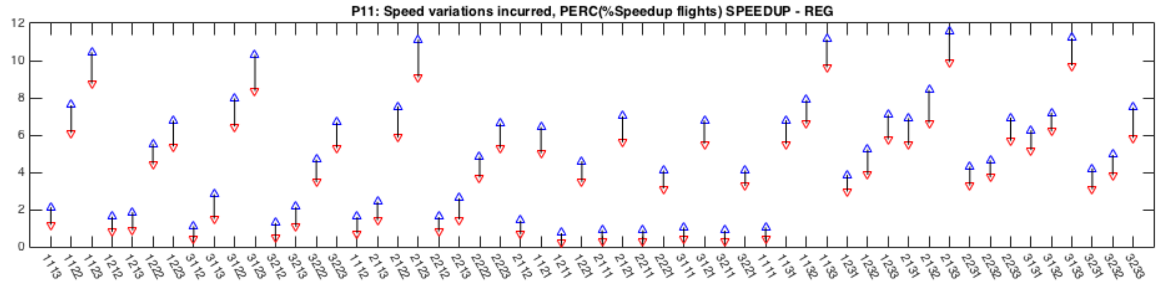

P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP - LCC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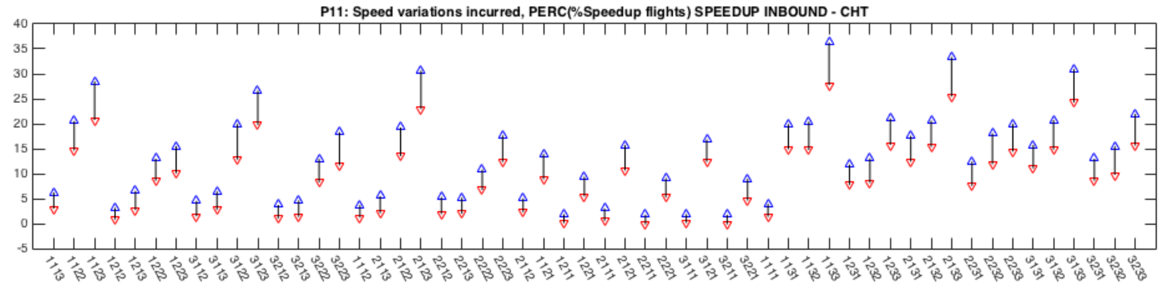
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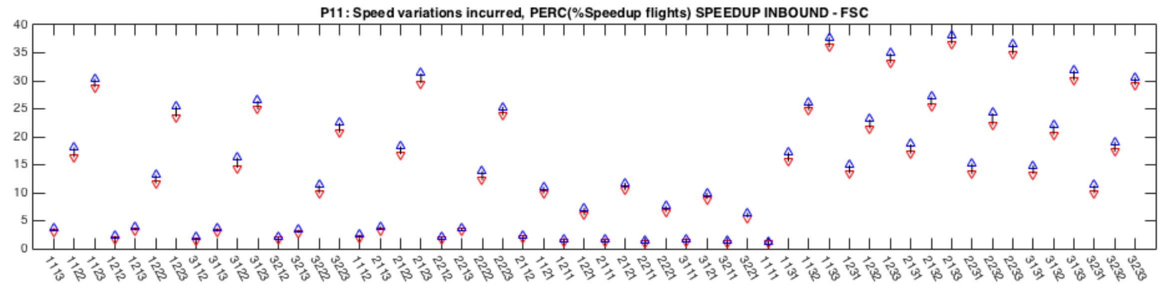
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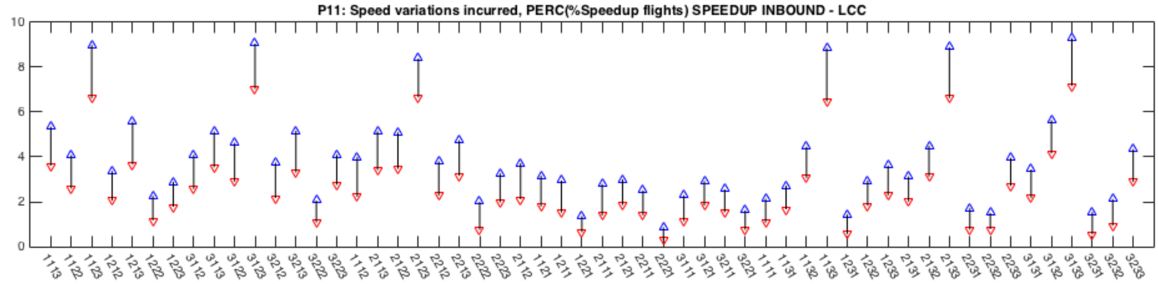
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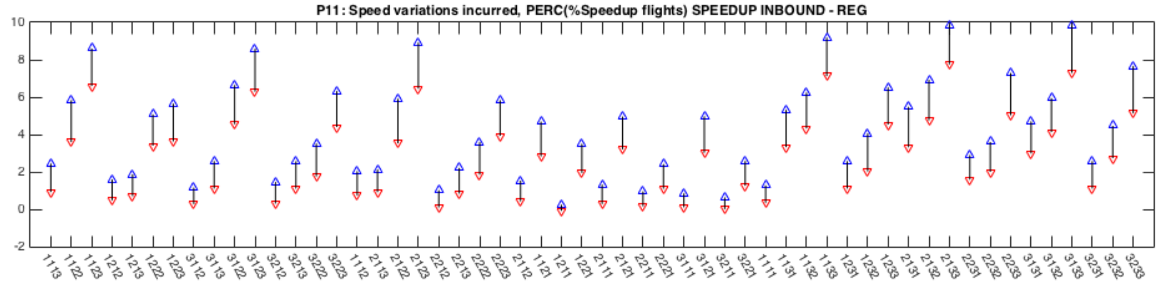
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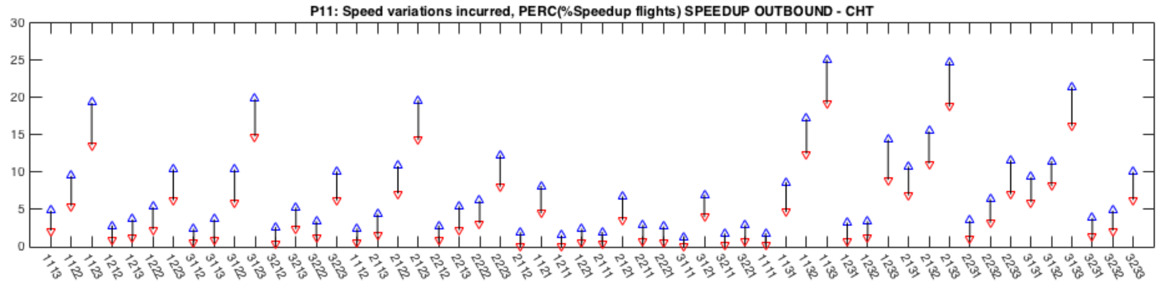
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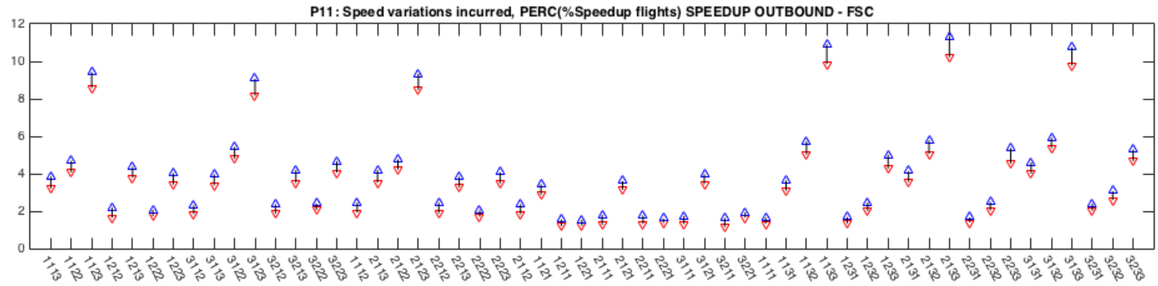
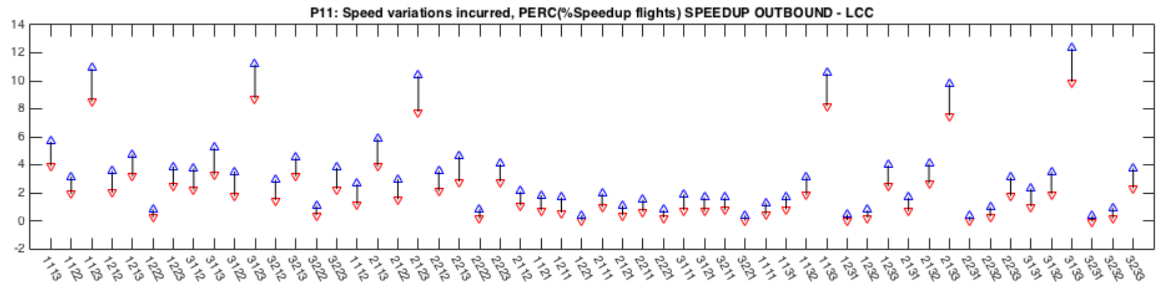
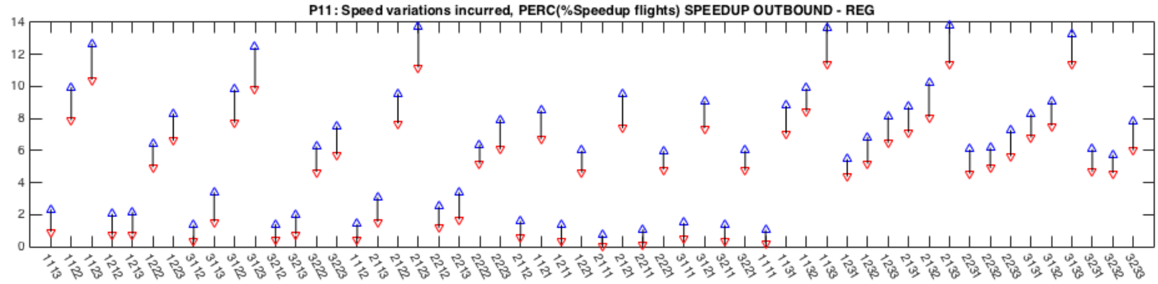
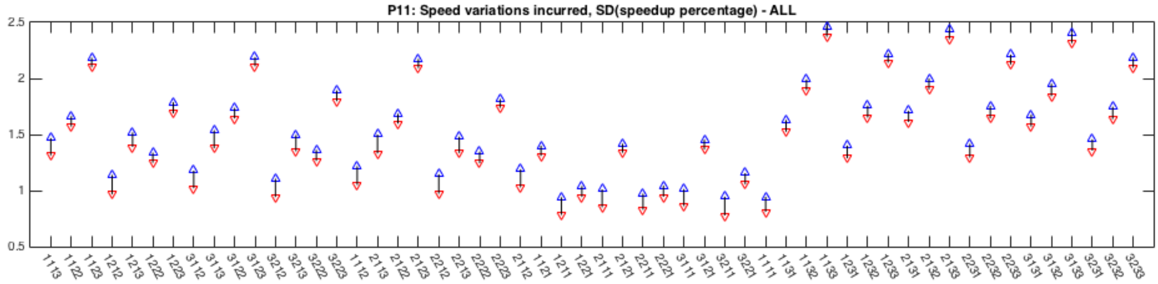
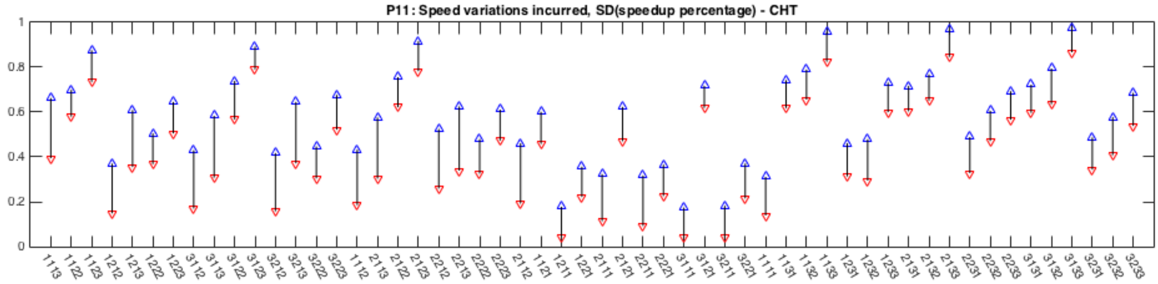
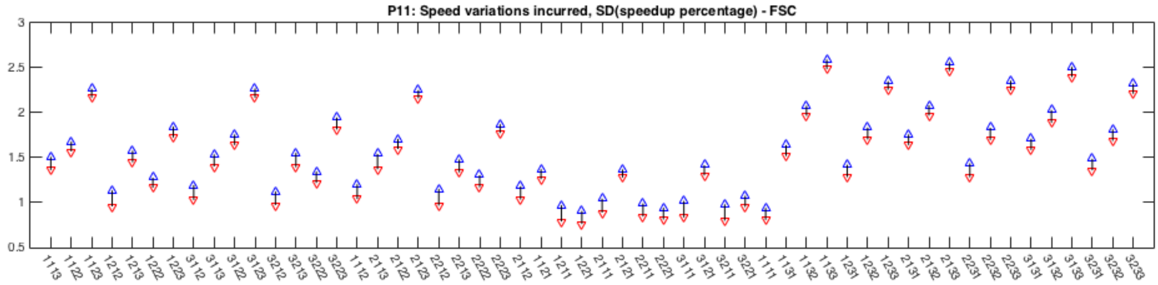

P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP OUTBOUND - FSC

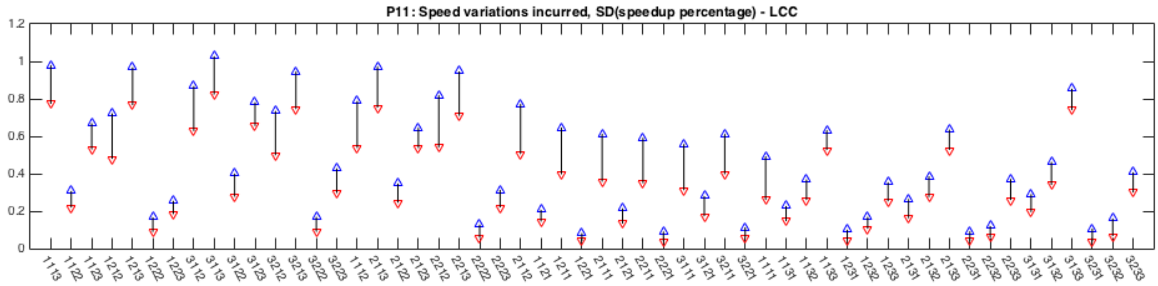

P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP OUTBOUND - LCC

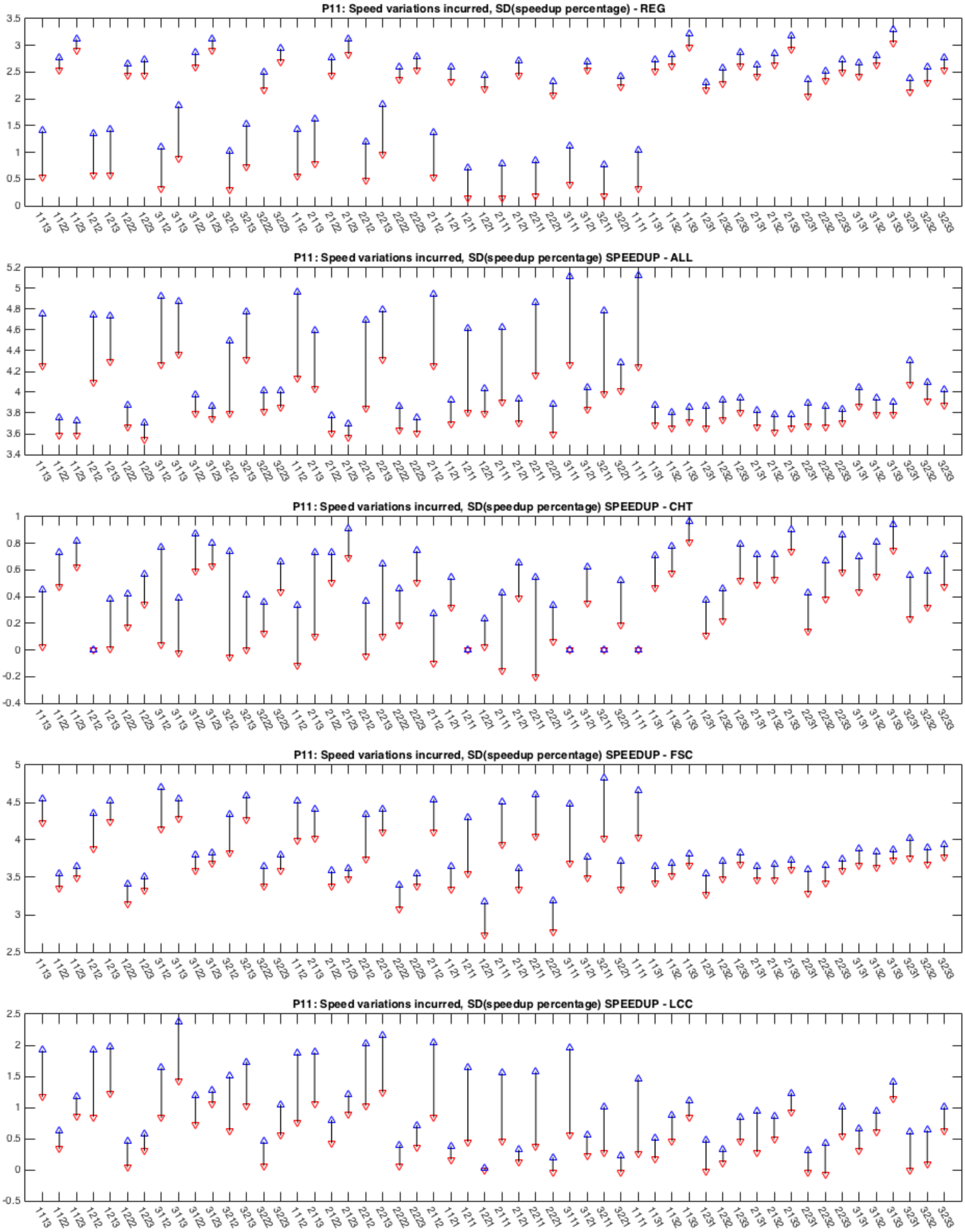

P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP OUTBOUND - REG

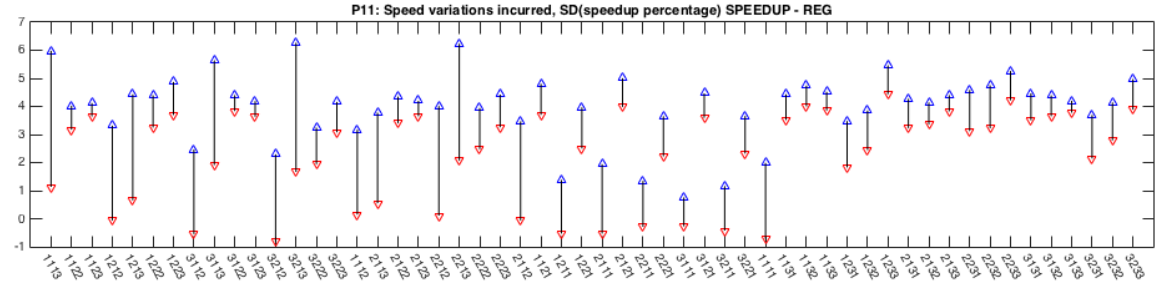

P11: Speed variations incurred, SD(speedup percentage) - ALL

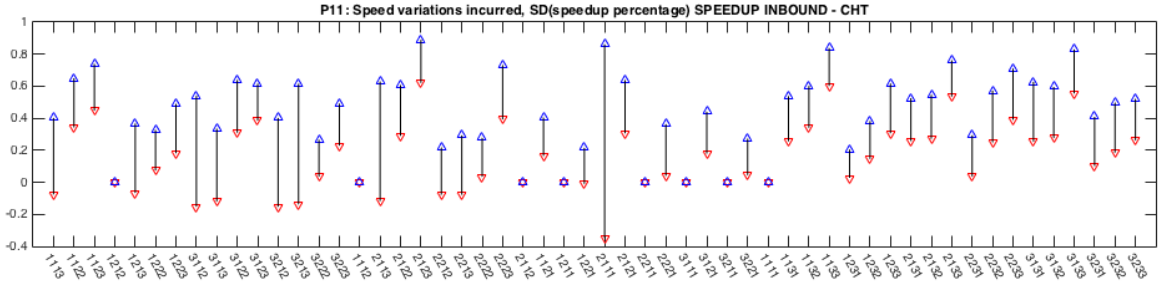

P11: Speed variations incurred, SD(speedup percentage) - CHT

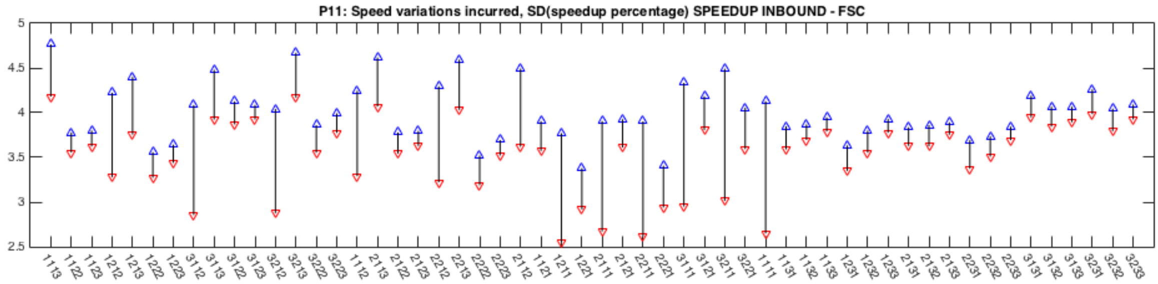

P11: Speed variations incurred, SD(speedup percentage) - FSC

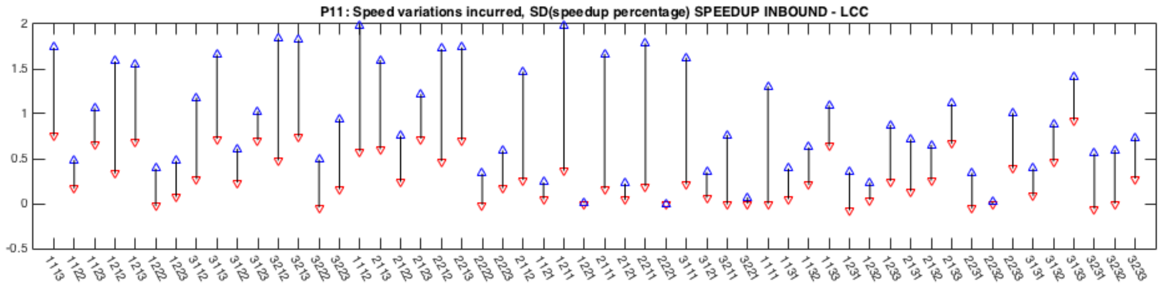

P11: Speed variations incurred, SD(speedup percentage) - LCC

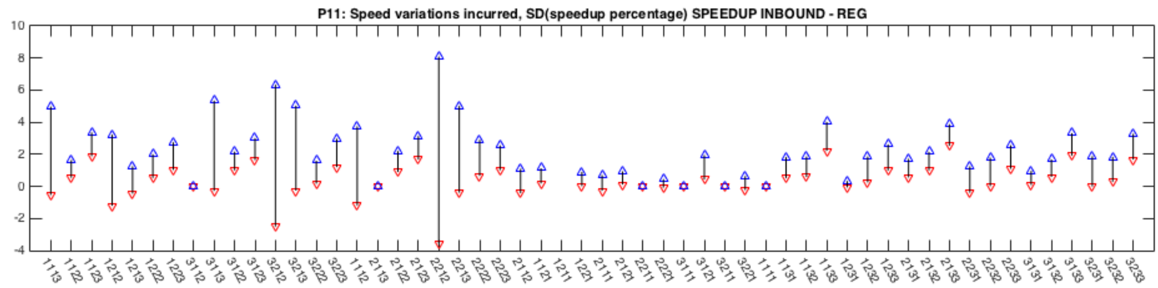

P11: Speed variations incurred, SD(speedup percentage) - REG
P11: Speed variations incurred, SD(speedup percentage) SPEEDUP - ALL
P11: Speed variations incurred, SD(speedup percentage) SPEEDUP - CHT
P11: Speed variations incurred, SD(speedup percentage) SPEEDUP - FSC
P11: Speed variations incurred, SD(speedup percentage) SPEEDUP - LCC

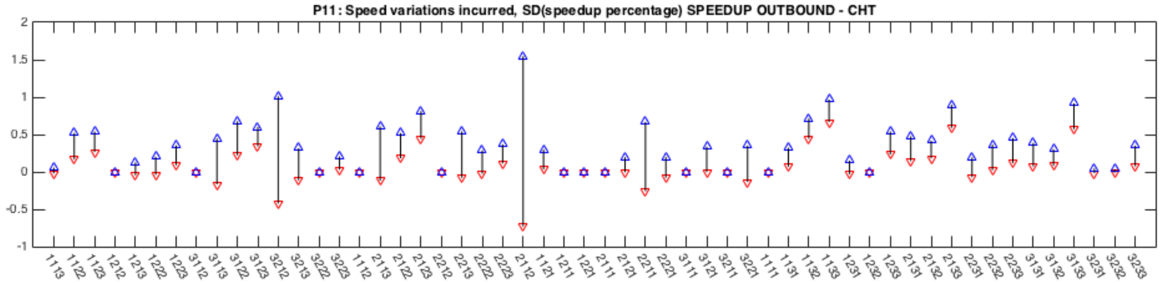

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP - REG

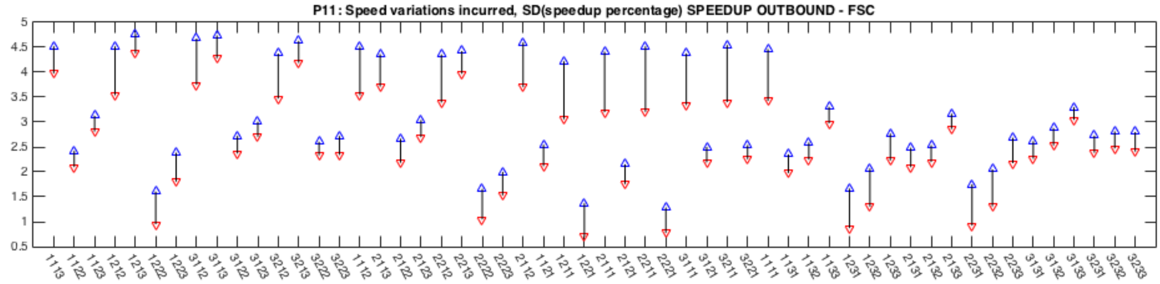

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP INBOUND - CHT

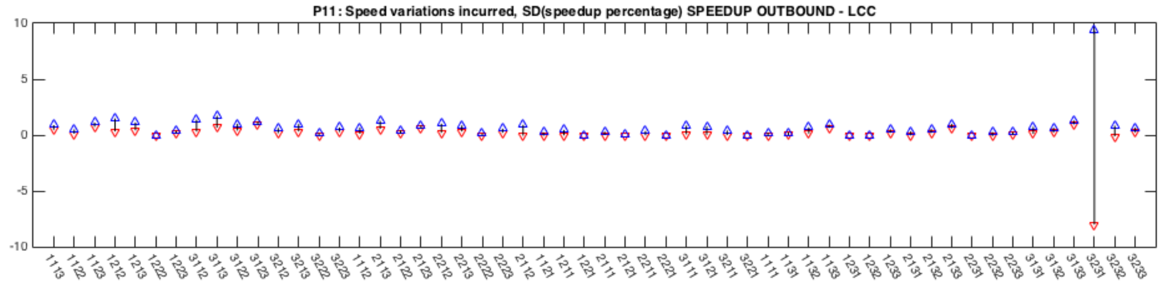

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP INBOUND - FSC

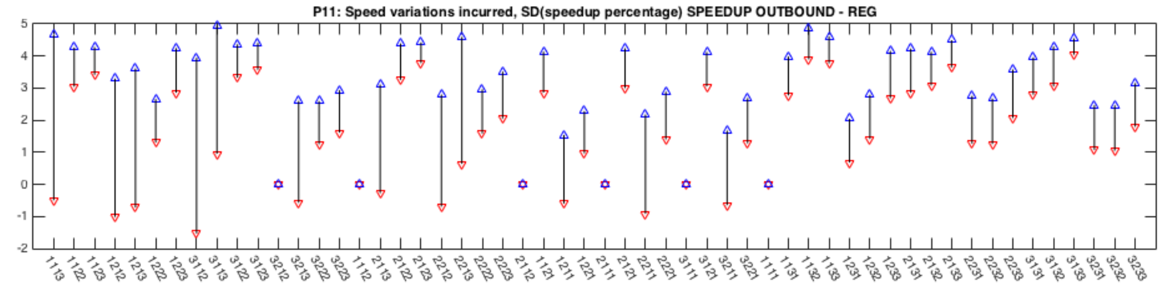

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP INBOUND - LCC

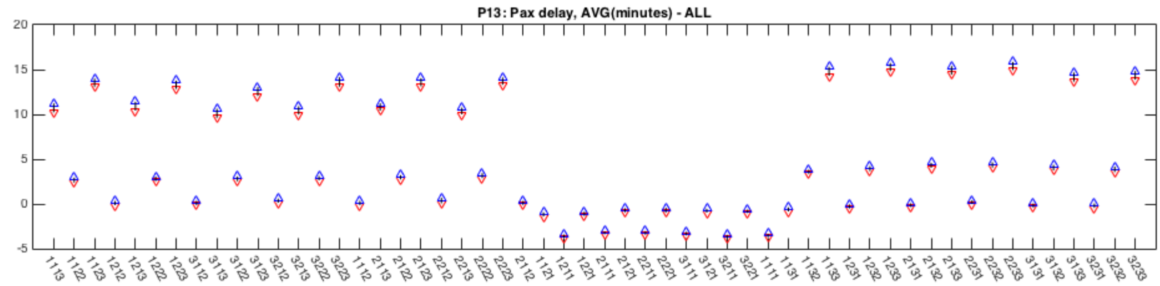

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP INBOUND - REG

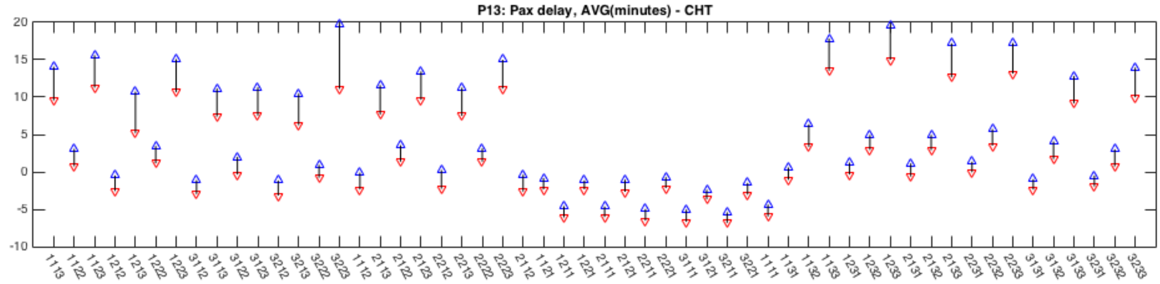

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP OUTBOUND - CHT

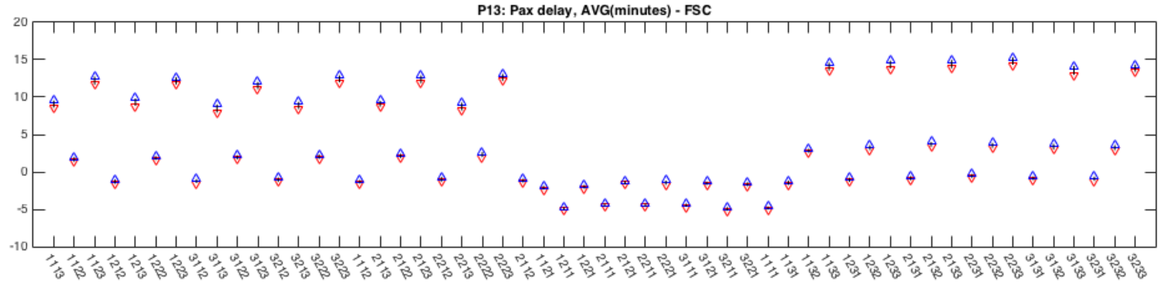

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP OUTBOUND - FSC

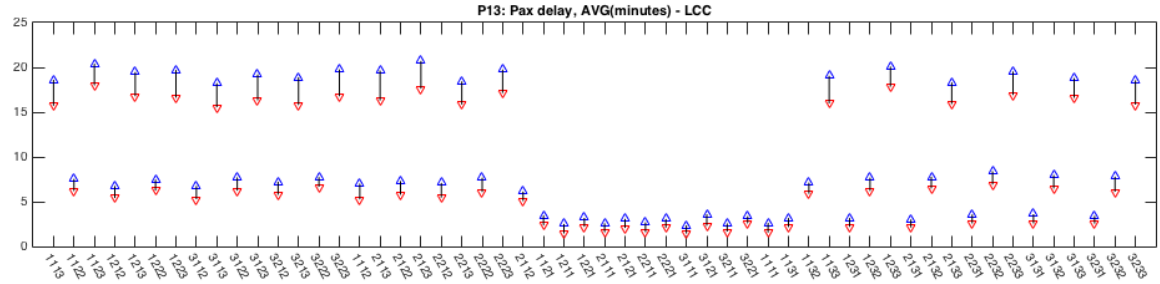

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP OUTBOUND - LCC

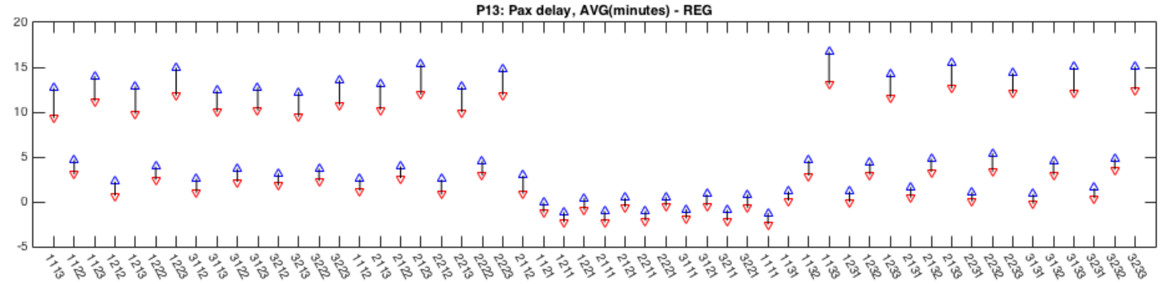

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP OUTBOUND - REG

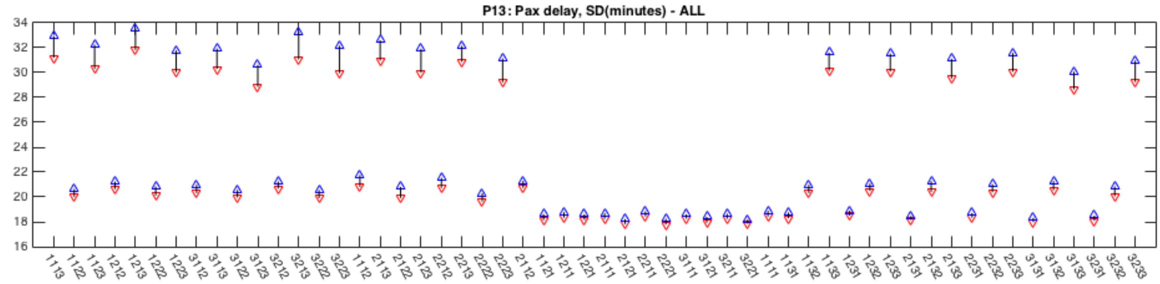

P13: Pax delay, AVG(minutes) - ALL

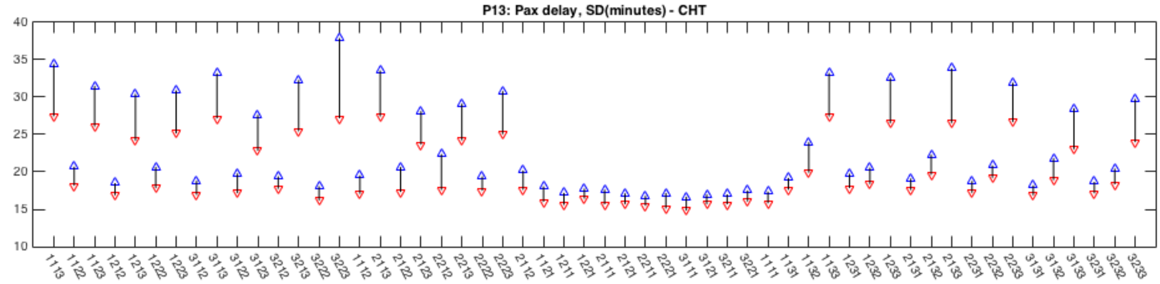

P13: Pax delay, AVG(minutes) - CHT

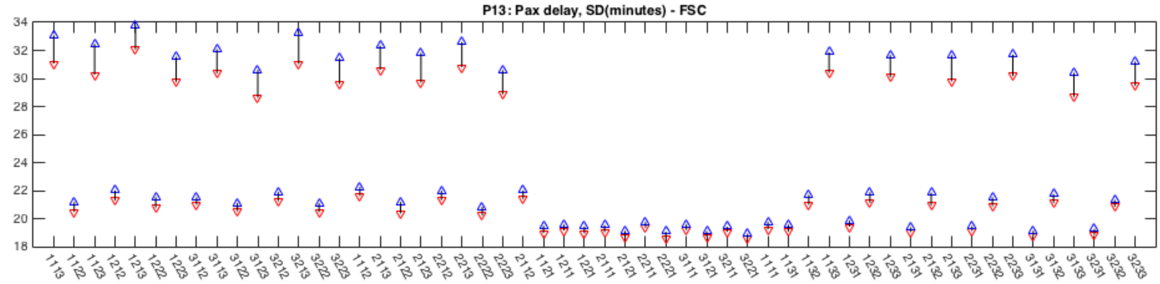

P13: Pax delay, AVG(minutes) - FSC

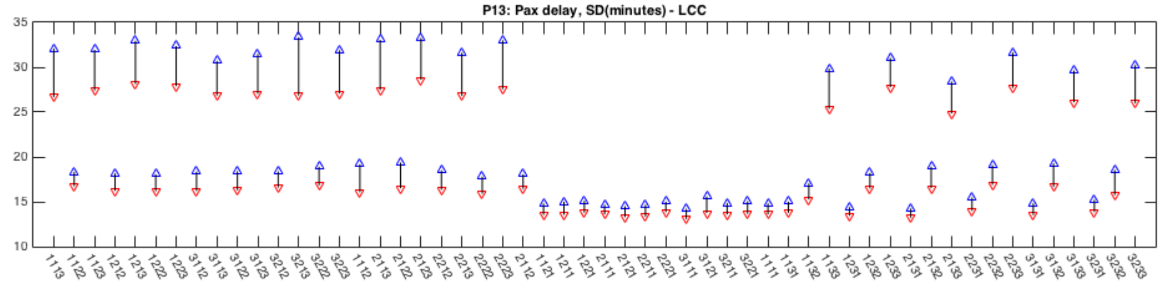

P13: Pax delay, AVG(minutes) - LCC

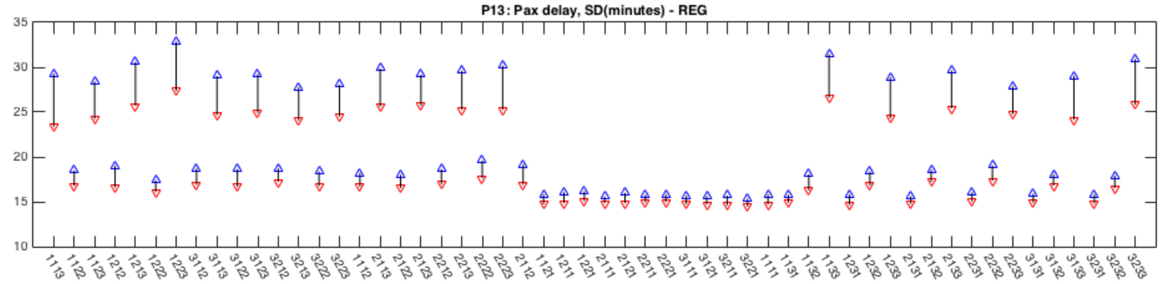

P13: Pax delay, AVG(minutes) - REG

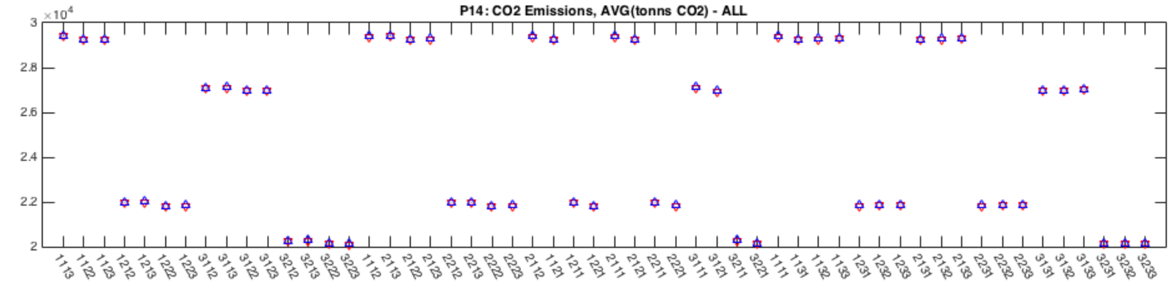

P13: Pax delay, SD(minutes) - ALL

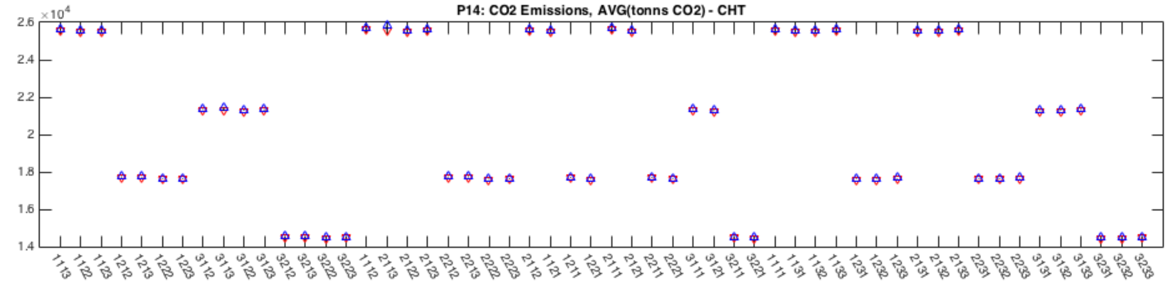

P13: Pax delay, SD(minutes) - CHT

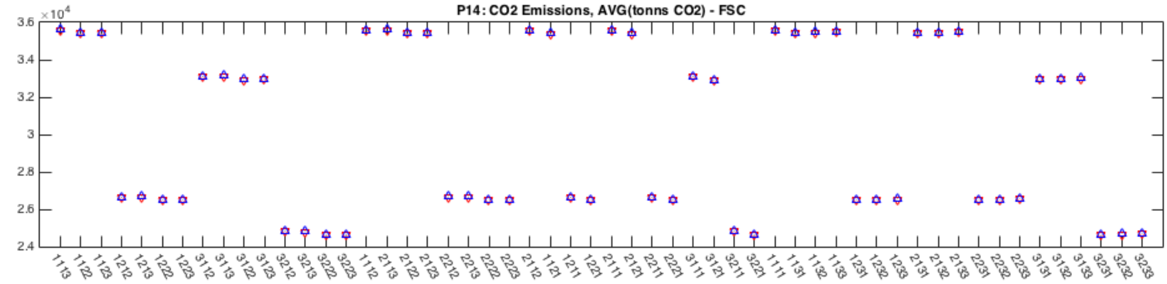

P13: Pax delay, SD(minutes) - FSC

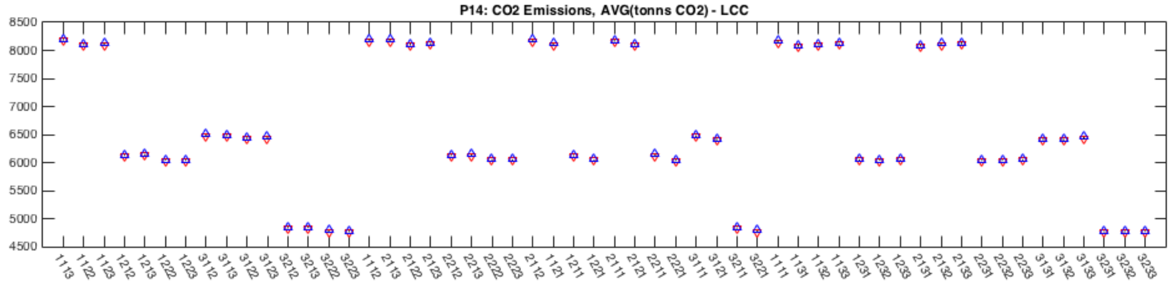

P13: Pax delay, SD(minutes) - LCC

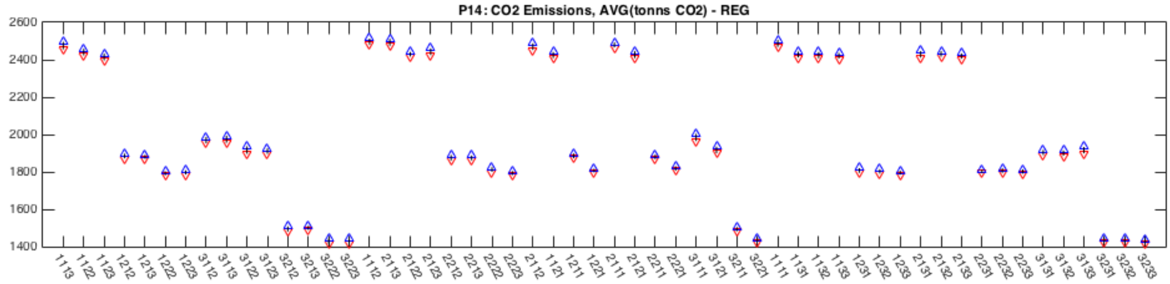

P13: Pax delay, SD(minutes) - REG

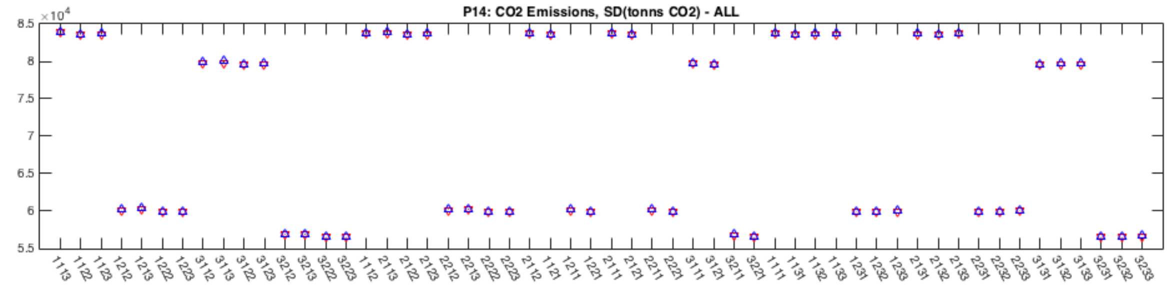

P14: CO2 Emissions, AVG(tonns CO2) - ALL

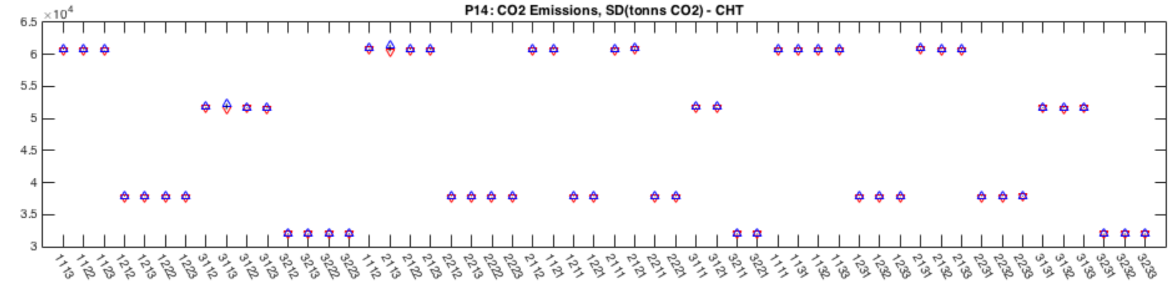

P14: CO2 Emissions, AVG(tonns CO2) - CHT

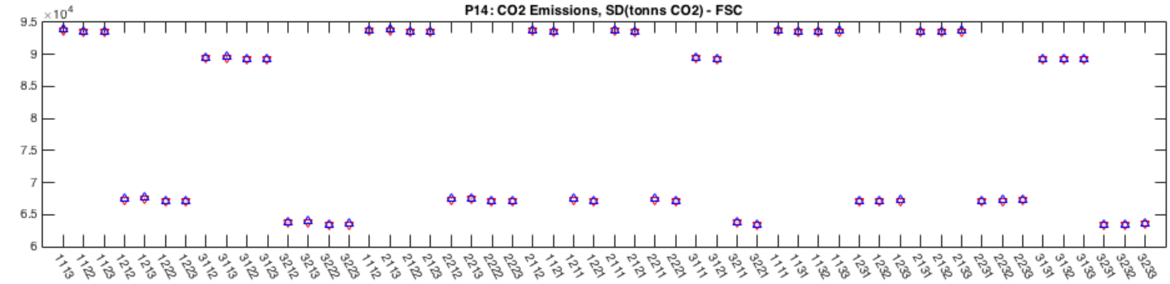

P14: CO2 Emissions, AVG(tonns CO2) - FSC

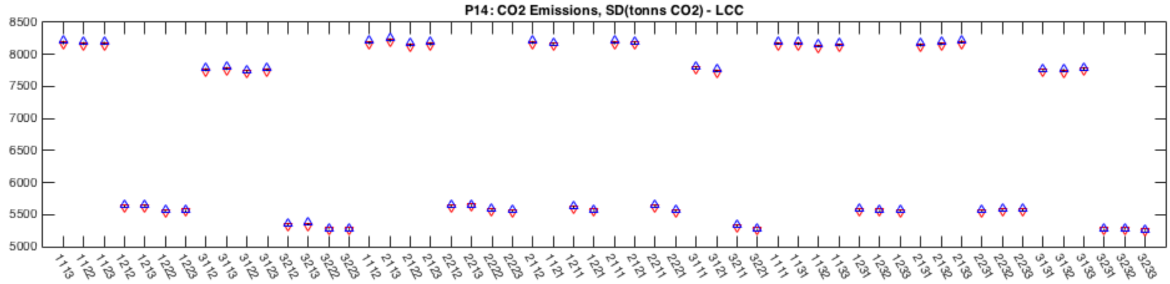

P14: CO2 Emissions, AVG(tonns CO2) - LCC

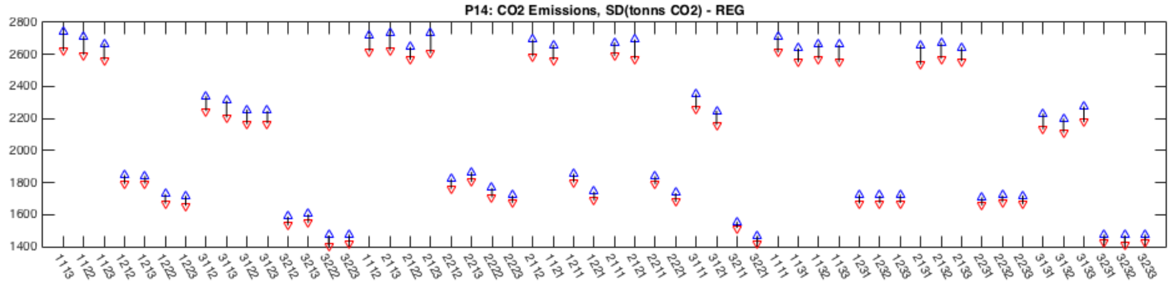

P14: CO2 Emissions, AVG(tonns CO2) - REG

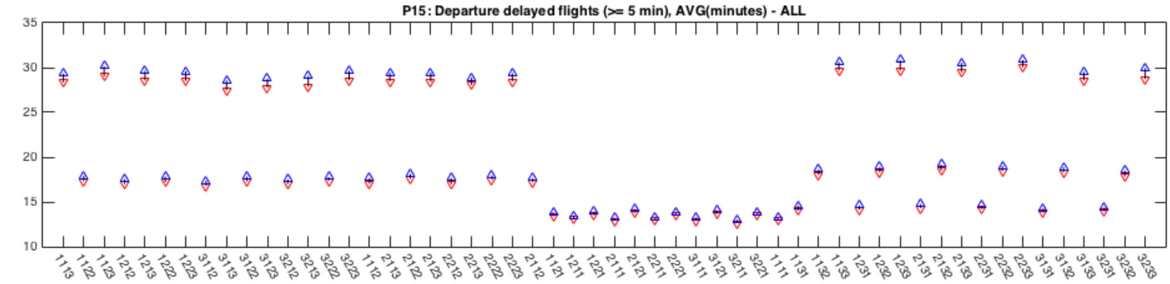

P14: CO2 Emissions, SD(tonns CO2) - ALL

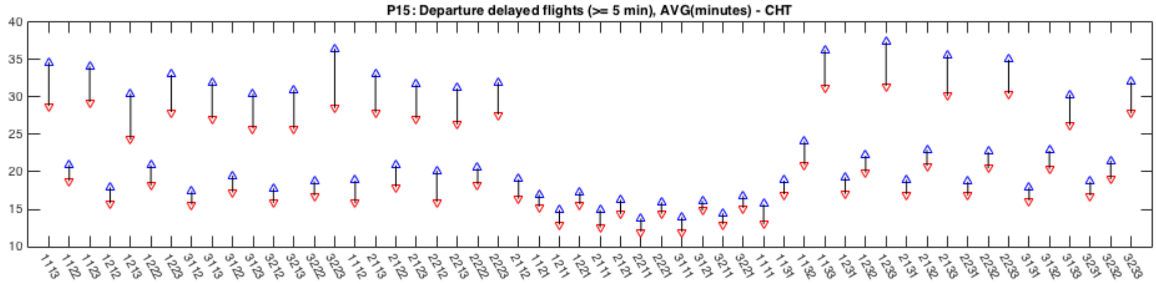

P14: CO2 Emissions, SD(tonns CO2) - CHT

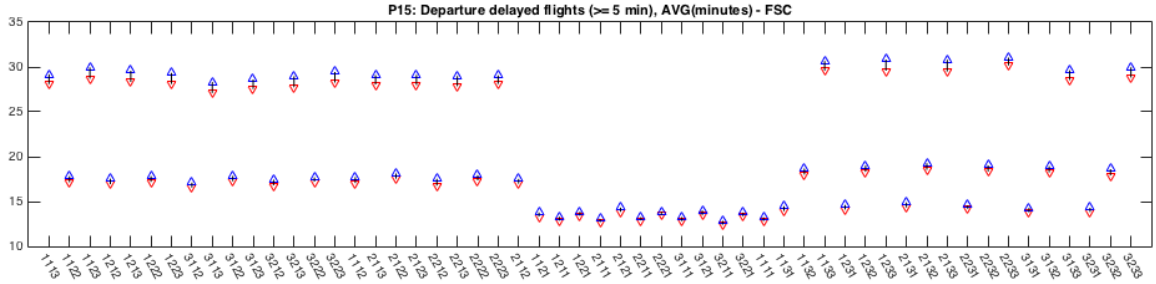

P14: CO2 Emissions, SD(tonns CO2) - FSC

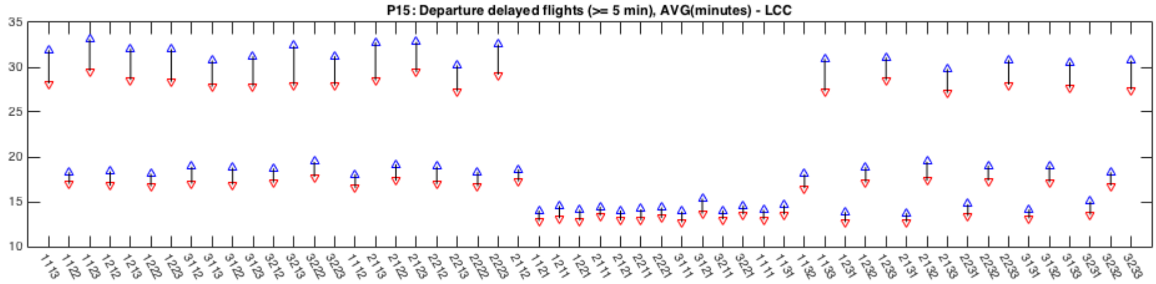

P14: CO2 Emissions, SD(tonns CO2) - LCC

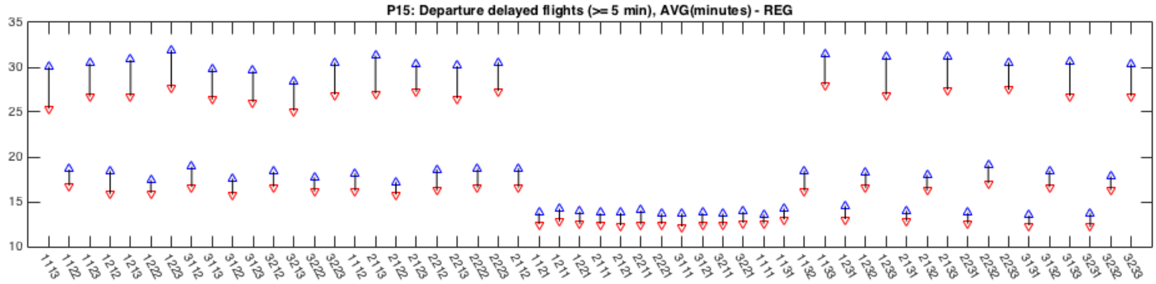

P14: CO2 Emissions, SD(tonns CO2) - REG

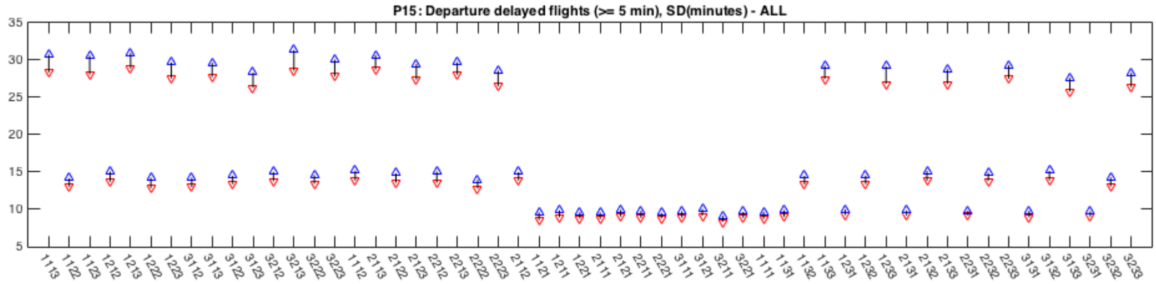

P15: Departure delayed flights (>= 5 min), AVG(minutes) - ALL

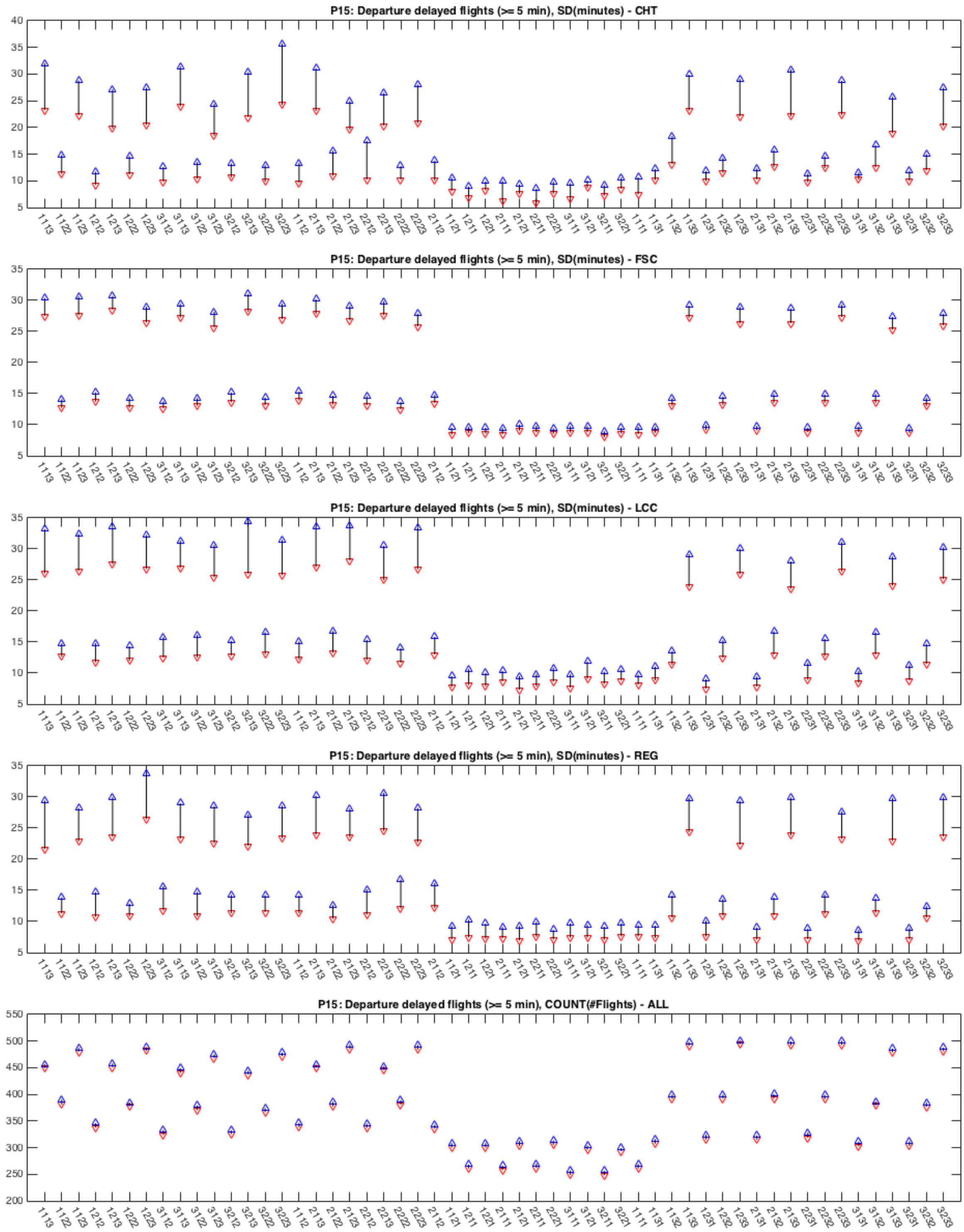

P15: Departure delayed flights (>= 5 min), AVG(minutes) - CHT

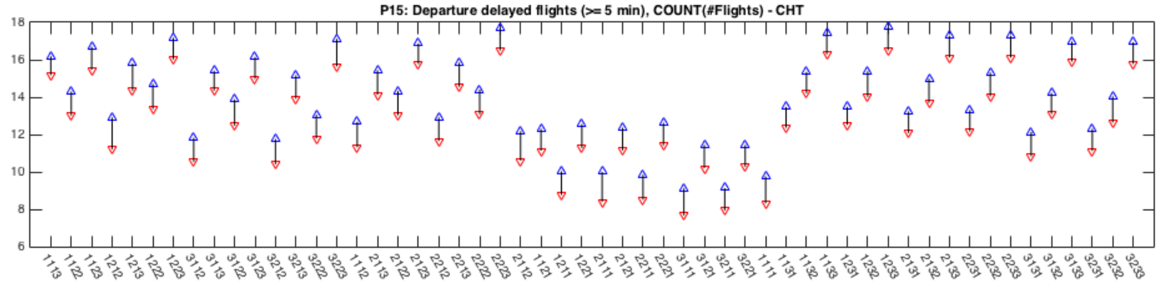

P15: Departure delayed flights (>= 5 min), AVG(minutes) - FSC

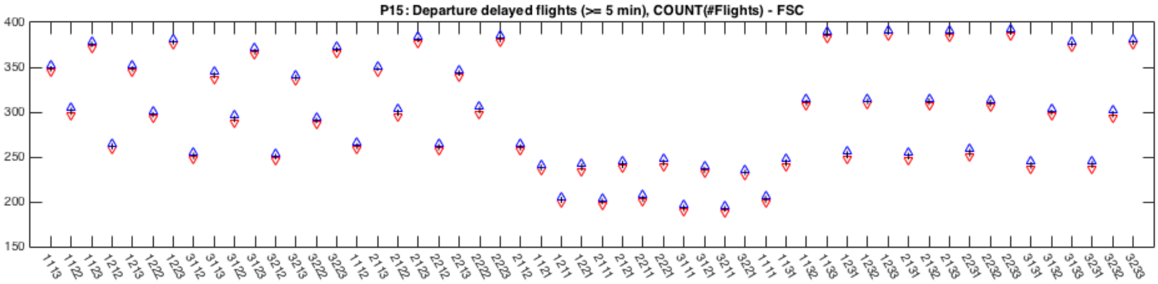

P15: Departure delayed flights (>= 5 min), AVG(minutes) - LCC

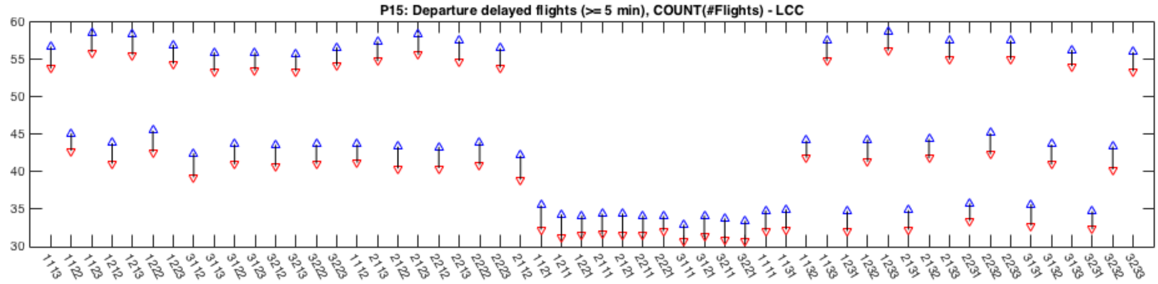

P15: Departure delayed flights (>= 5 min), AVG(minutes) - REG

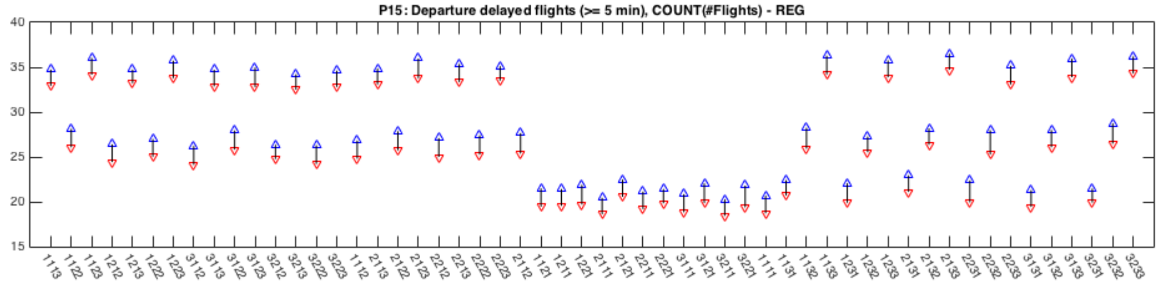

P15: Departure delayed flights (>= 5 min), SD(minutes) - ALL

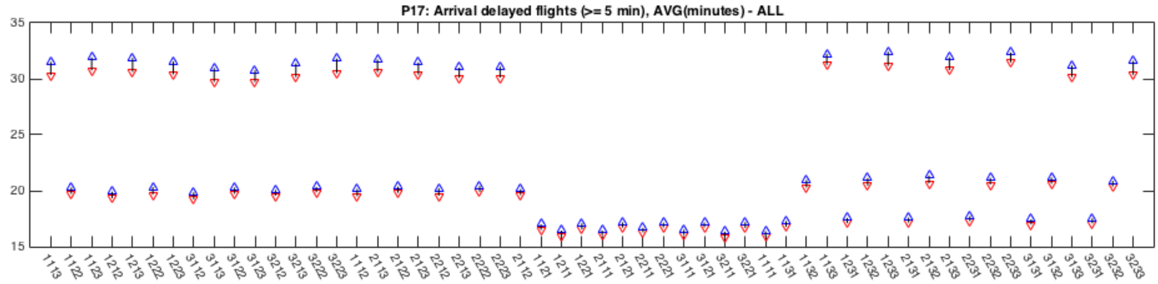

P15: Departure delayed flights (>= 5 min), SD(minutes) - CHT
P15: Departure delayed flights (>= 5 min), SD(minutes) - FSC
P15: Departure delayed flights (>= 5 min), SD(minutes) - LCC
P15: Departure delayed flights (>= 5 min), SD(minutes) - REG
P15: Departure delayed flights (>= 5 min), COUNT(#Flights) - ALL

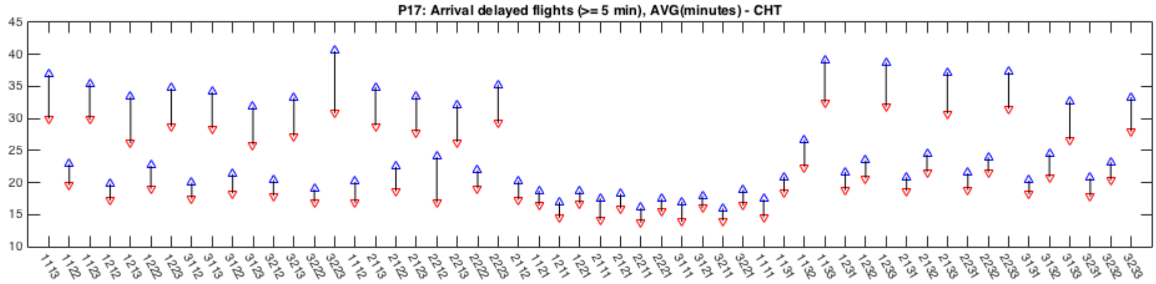

P15: Departure delayed flights (>= 5 min), COUNT(#Flights) - CHT

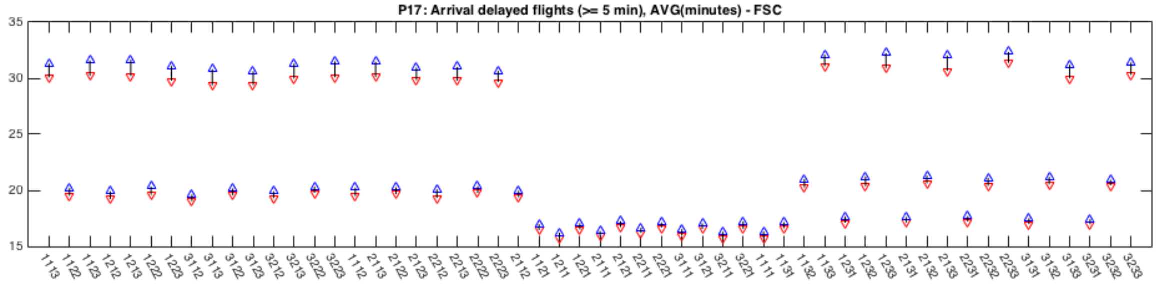

P15: Departure delayed flights (>= 5 min), COUNT(#Flights) - FSC

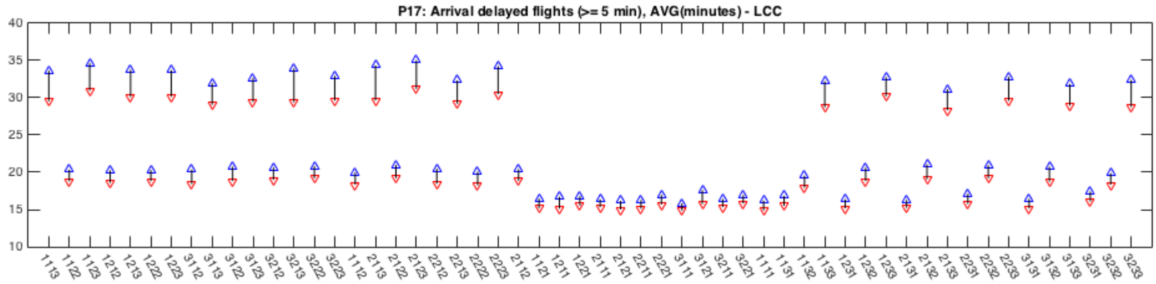

P15: Departure delayed flights (>= 5 min), COUNT(#Flights) - LCC

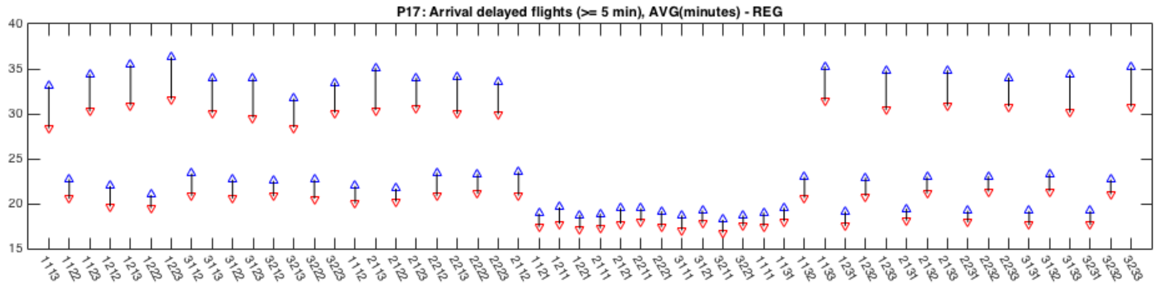

P15: Departure delayed flights (>= 5 min), COUNT(#Flights) - REG

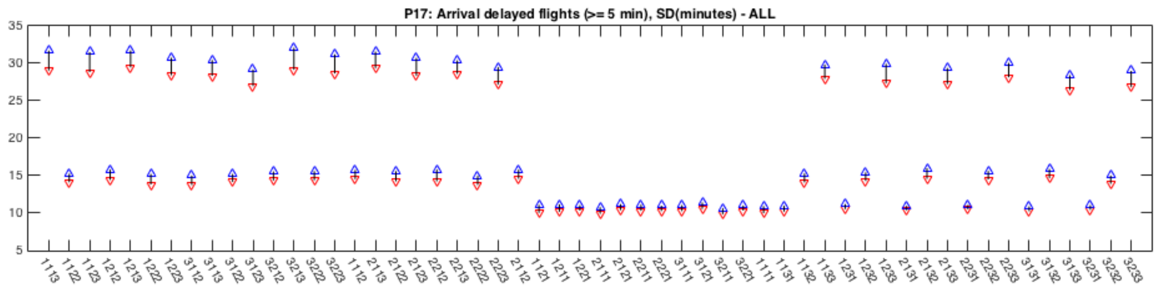

P17: Arrival delayed flights (>= 5 min), AVG(minutes) - ALL

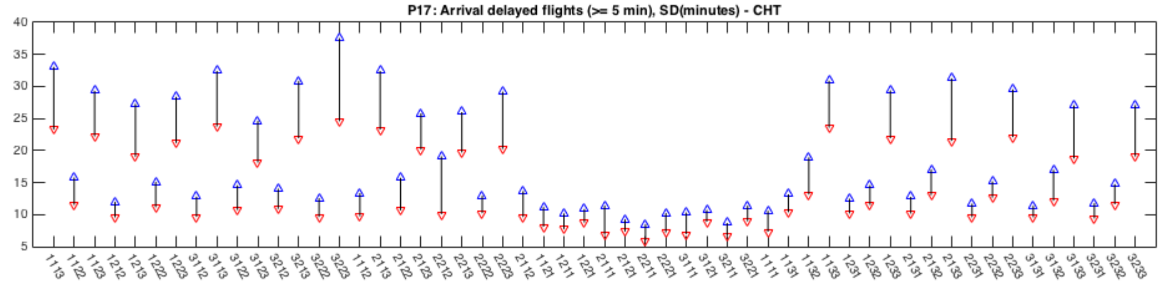

P17: Arrival delayed flights (>= 5 min), AVG(minutes) - CHT

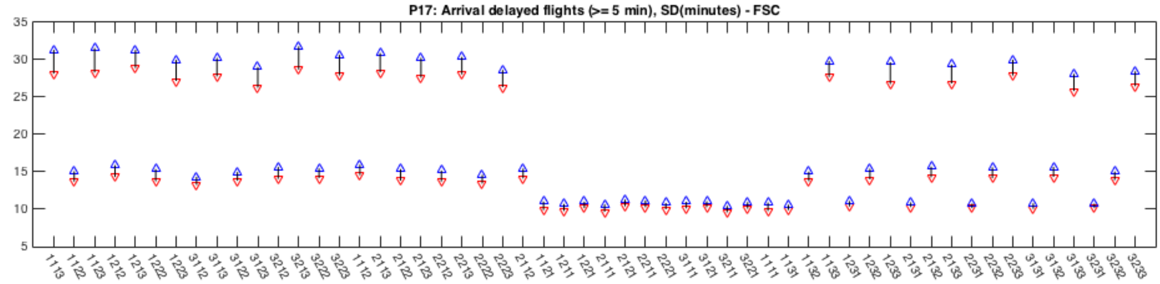

P17: Arrival delayed flights (>= 5 min), AVG(minutes) - FSC

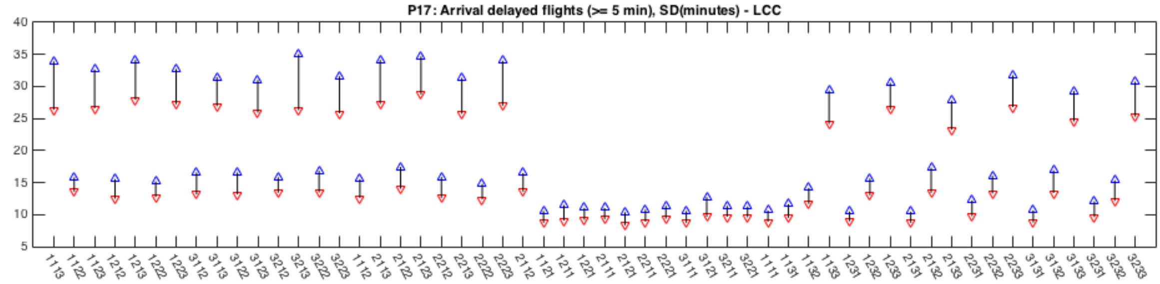

P17: Arrival delayed flights (>= 5 min), AVG(minutes) - LCC

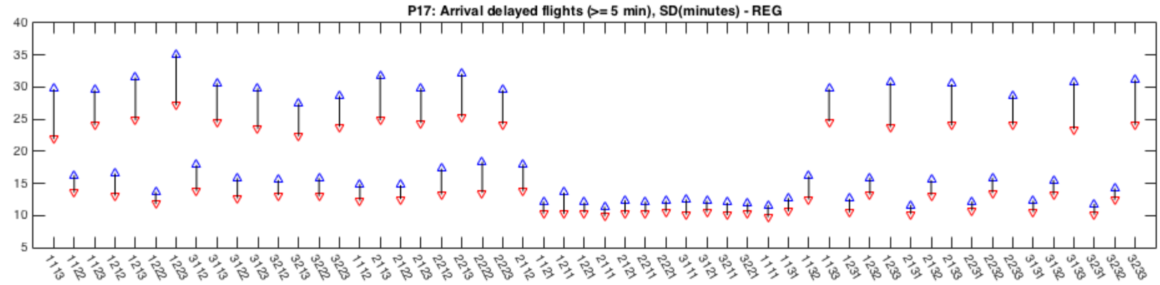

P17: Arrival delayed flights (>= 5 min), AVG(minutes) - REG

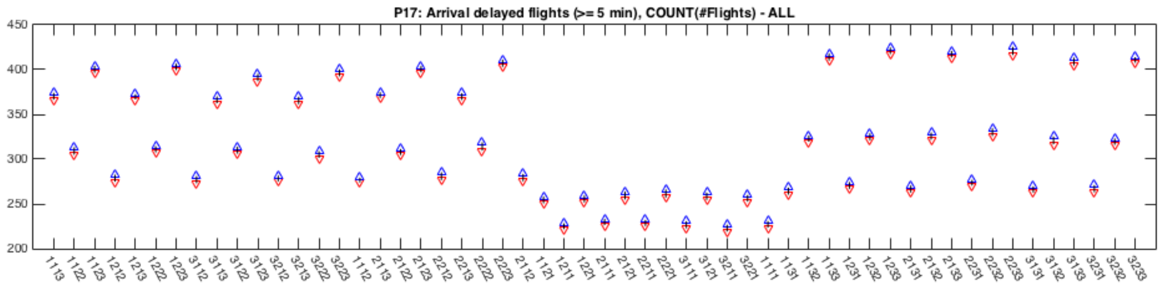

P17: Arrival delayed flights (>= 5 min), SD(minutes) - ALL

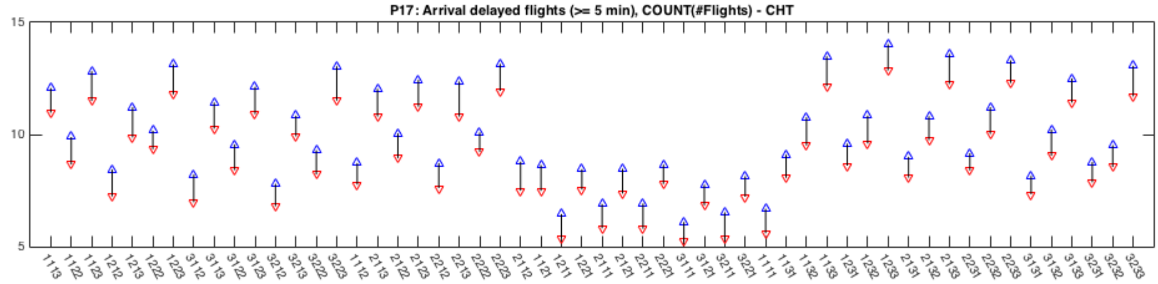

P17: Arrival delayed flights (>= 5 min), SD(minutes) - CHT

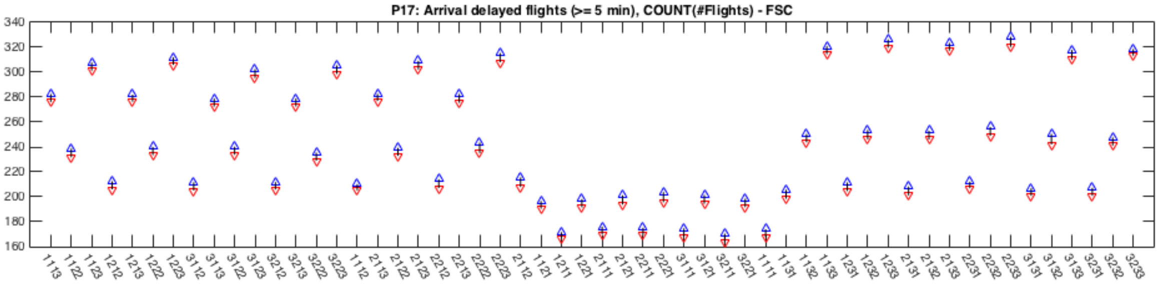

P17: Arrival delayed flights (>= 5 min), SD(minutes) - FSC

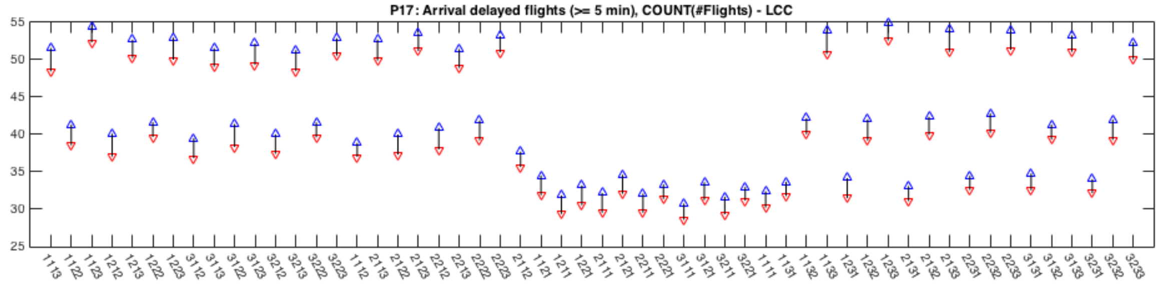

P17: Arrival delayed flights (>= 5 min), SD(minutes) - LCC

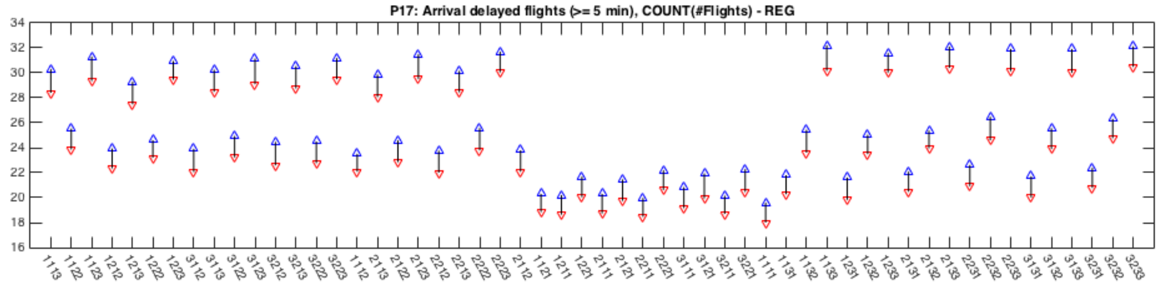

P17: Arrival delayed flights (>= 5 min), SD(minutes) - REG

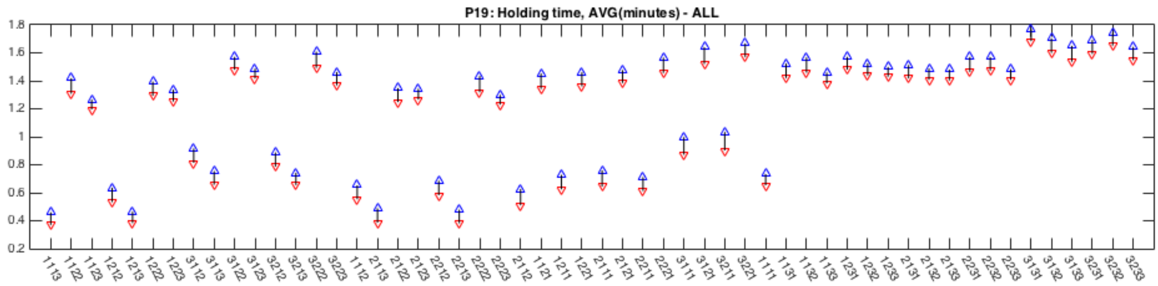

P17: Arrival delayed flights (>= 5 min), COUNT(#Flights) - ALL

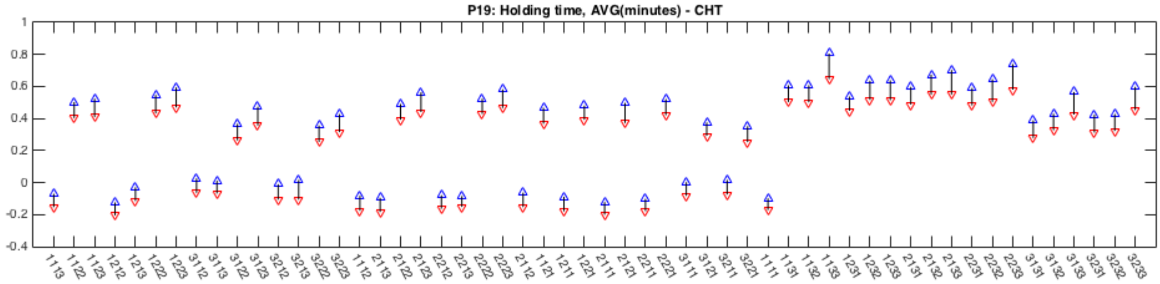

P17: Arrival delayed flights (>= 5 min), COUNT(#Flights) - CHT

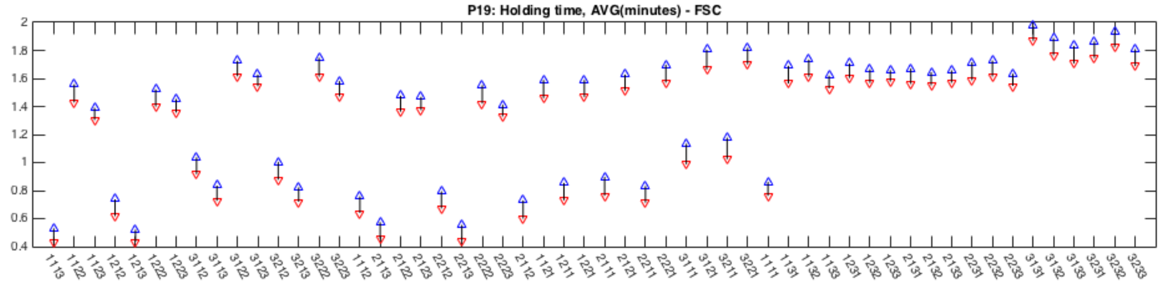

P17: Arrival delayed flights (>= 5 min), COUNT(#Flights) - FSC

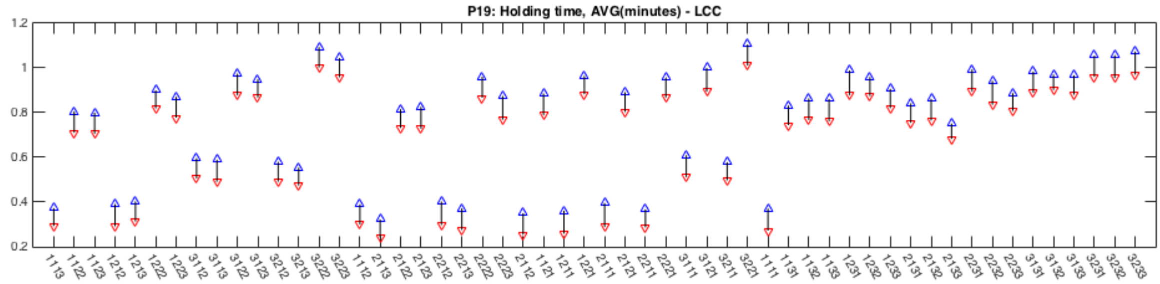

P17: Arrival delayed flights (>= 5 min), COUNT(#Flights) - LCC

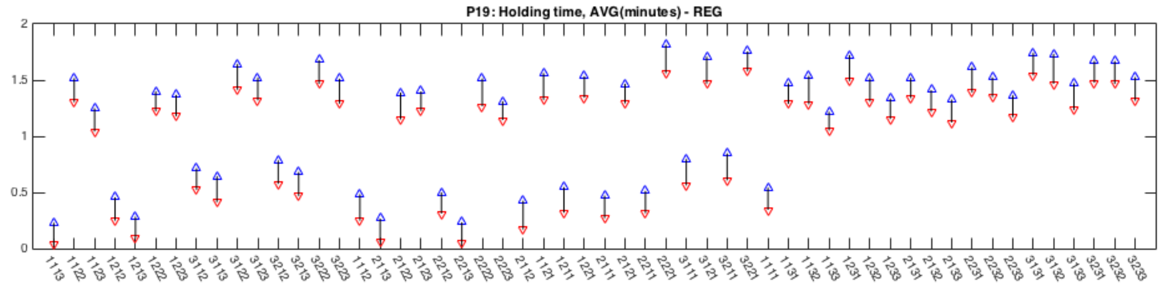

P17: Arrival delayed flights (>= 5 min), COUNT(#Flights) - REG

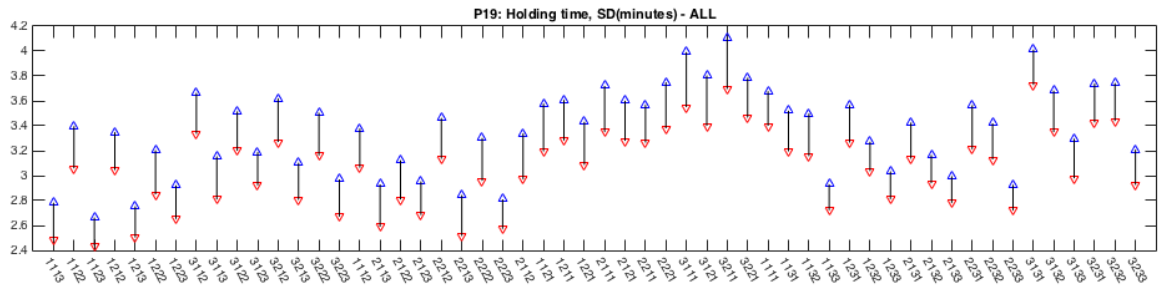

P19: Holding time, AVG(minutes) - ALL

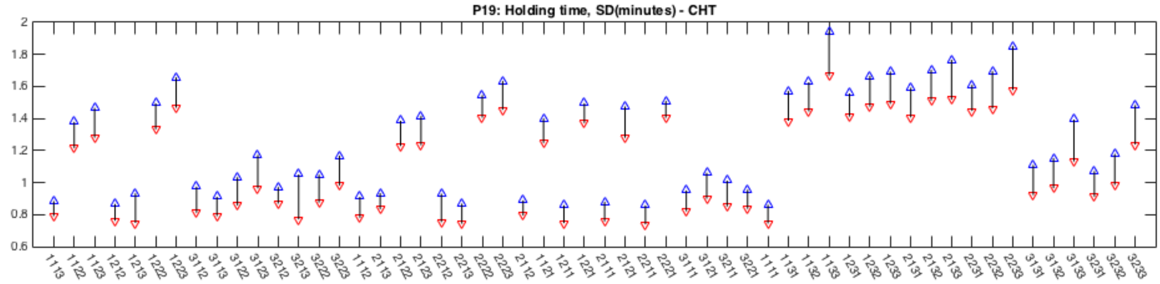

P19: Holding time, AVG(minutes) - CHT

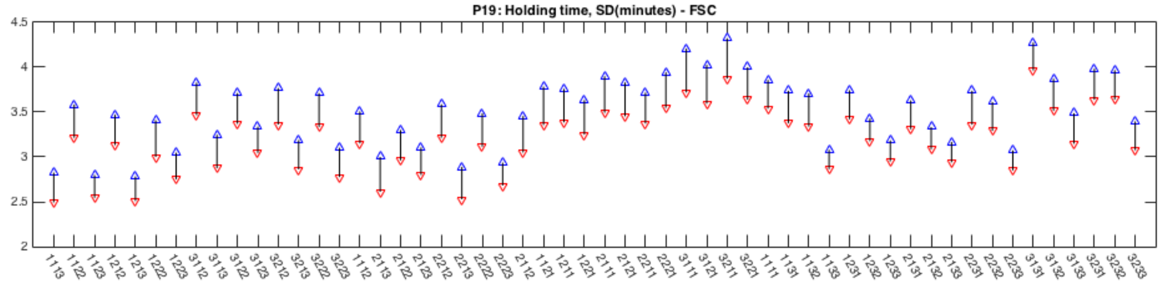

P19: Holding time, AVG(minutes) - FSC

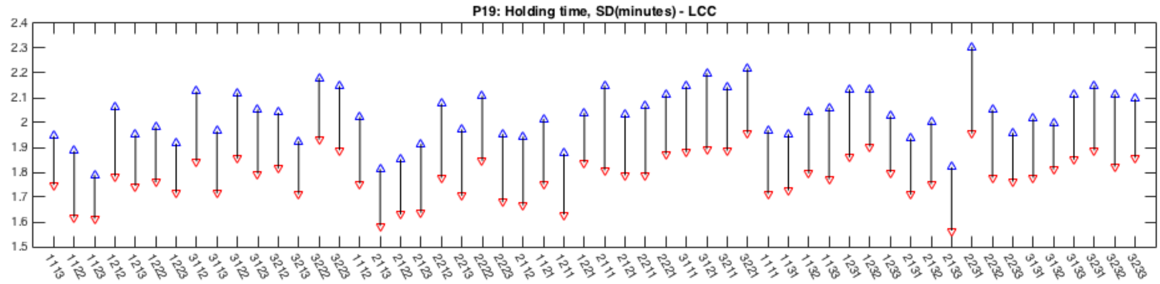

P19: Holding time, AVG(minutes) - LCC

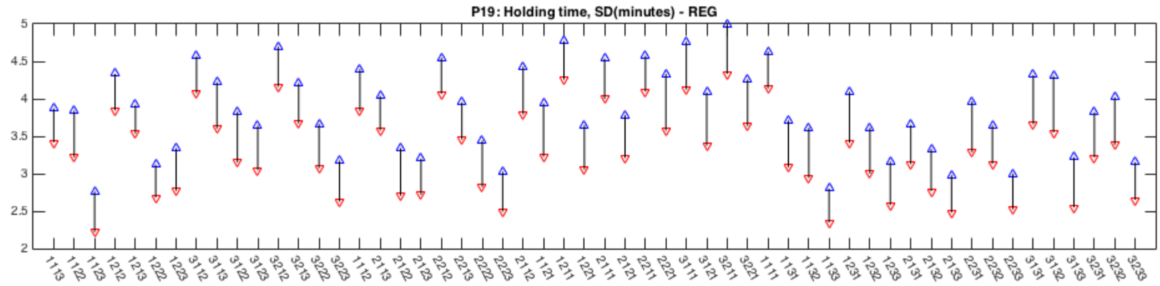

P19: Holding time, AVG(minutes) - REG

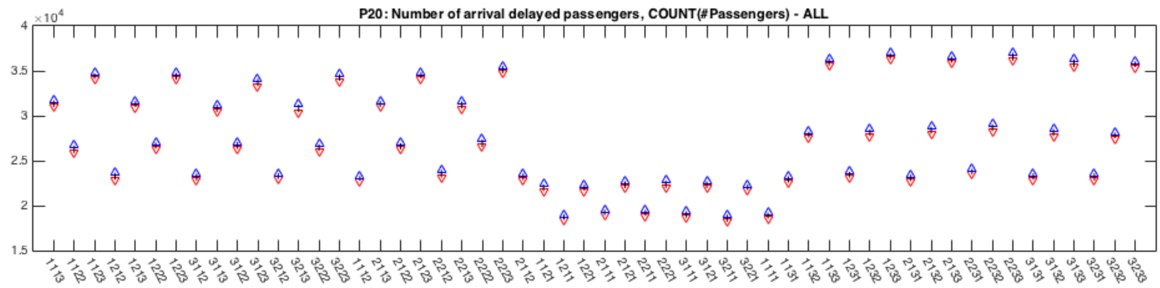

P19: Holding time, SD(minutes) - ALL

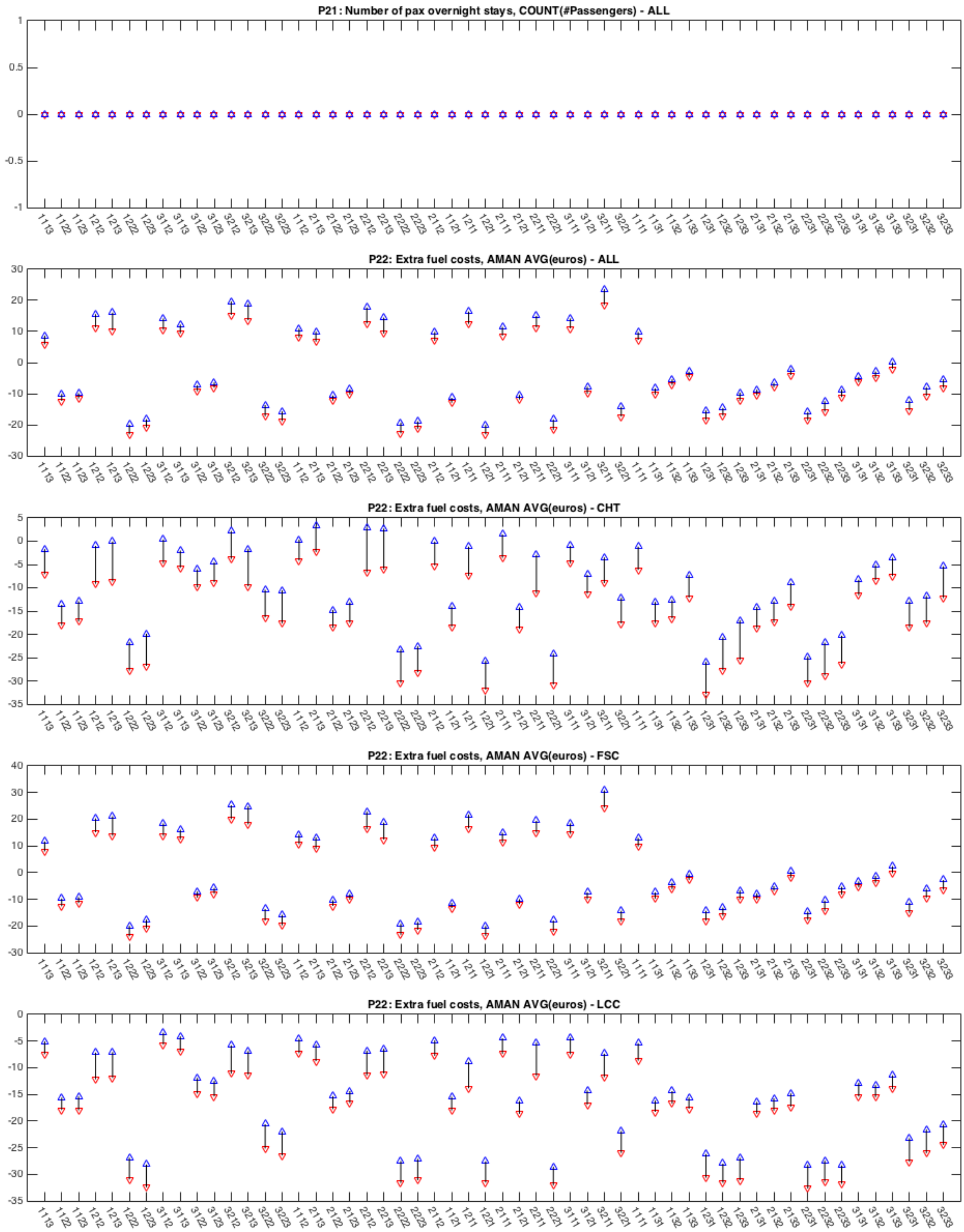

P19: Holding time, SD(minutes) - CHT

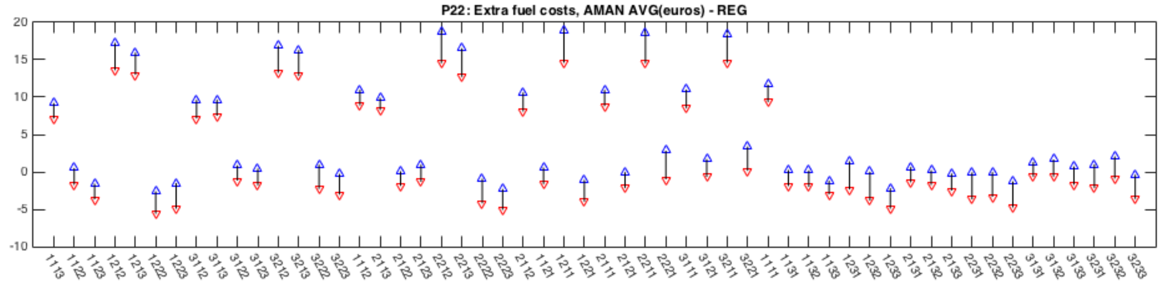

P19: Holding time, SD(minutes) - FSC

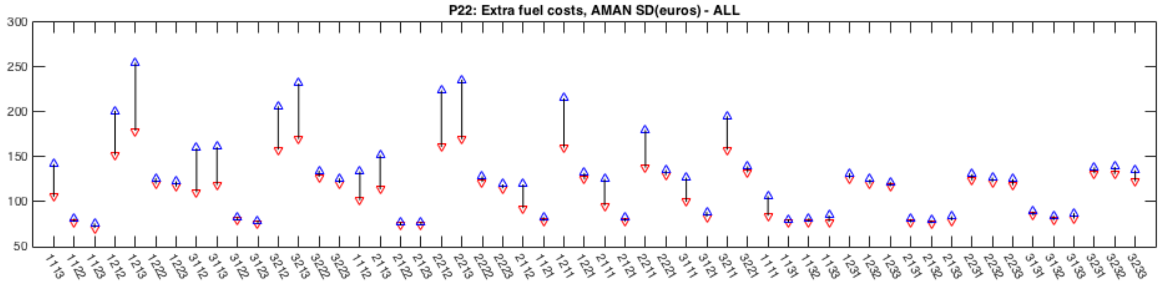

P19: Holding time, SD(minutes) - LCC

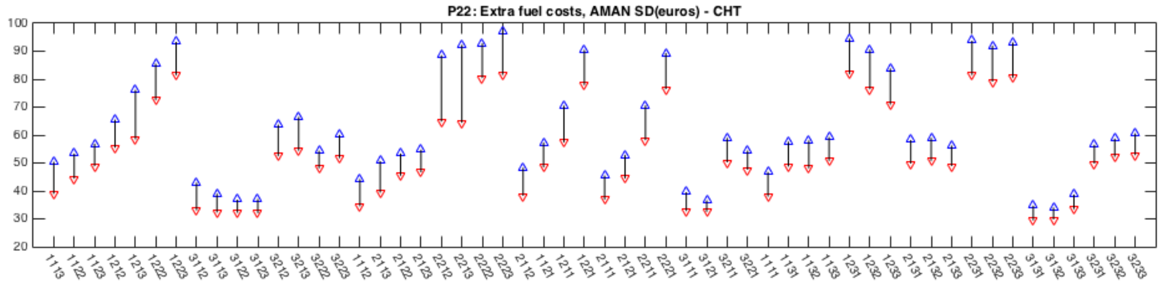

P19: Holding time, SD(minutes) - REG

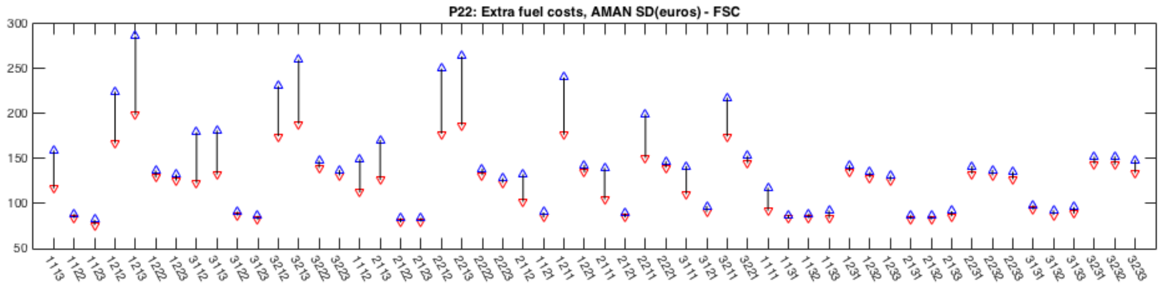

P20: Number of arrival delayed passengers, COUNT(#Passengers) - ALL

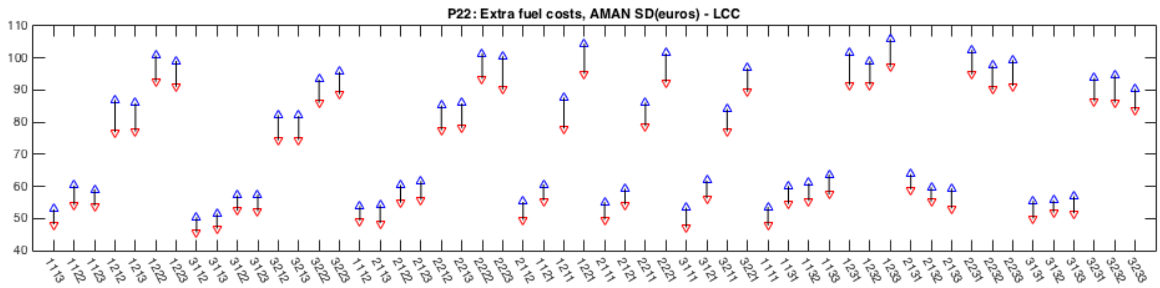

P21: Number of pax overnight stays, COUNT(#Passengers) - ALL
P22: Extra fuel costs, AMAN AVG(euros) - ALL
P22: Extra fuel costs, AMAN AVG(euros) - CHT
P22: Extra fuel costs, AMAN AVG(euros) - FSC
P22: Extra fuel costs, AMAN AVG(euros) - LCC

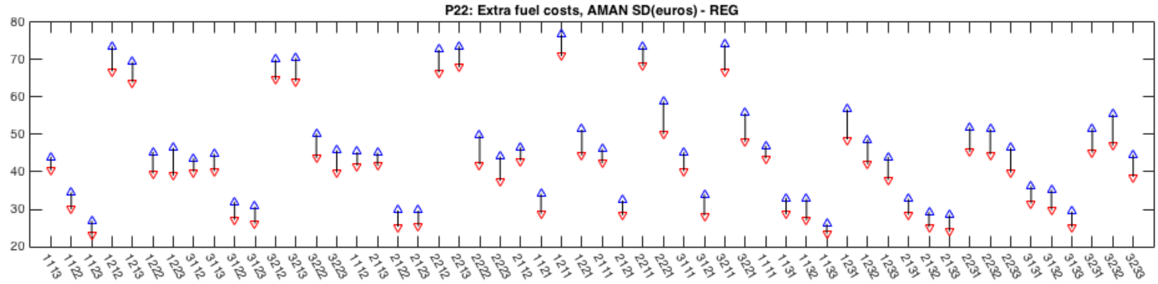

P22: Extra fuel costs, AMAN AVG(euros) - REG

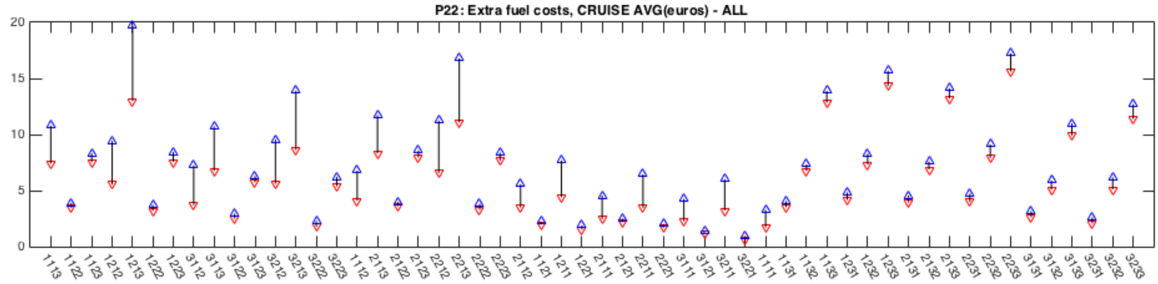

P22: Extra fuel costs, AMAN SD(euros) - ALL

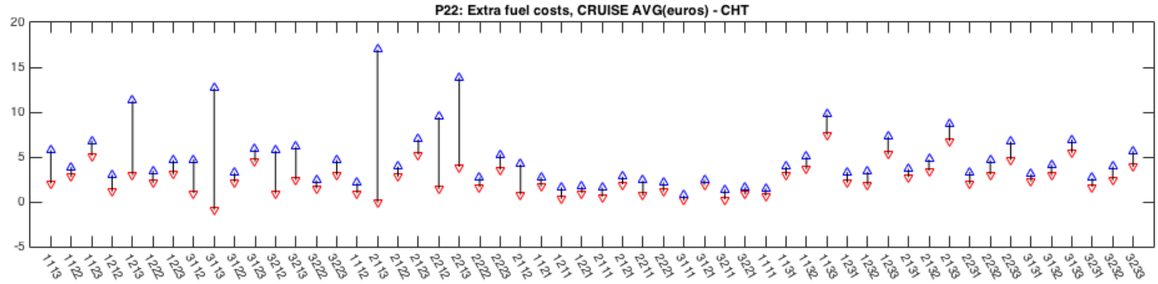

P22: Extra fuel costs, AMAN SD(euros) - CHT

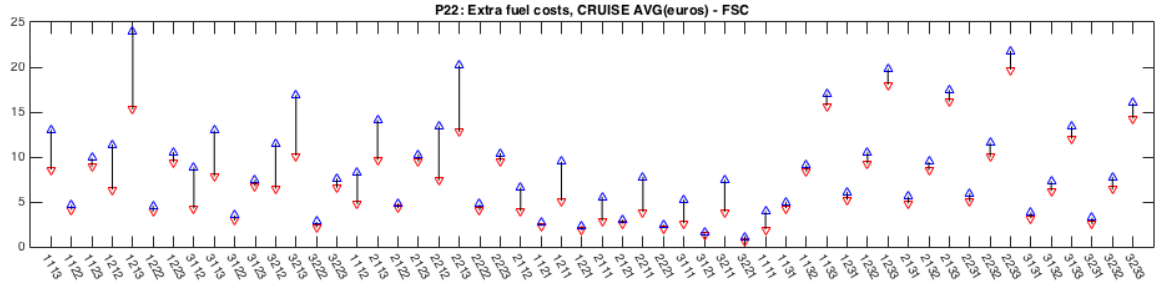

P22: Extra fuel costs, AMAN SD(euros) - FSC

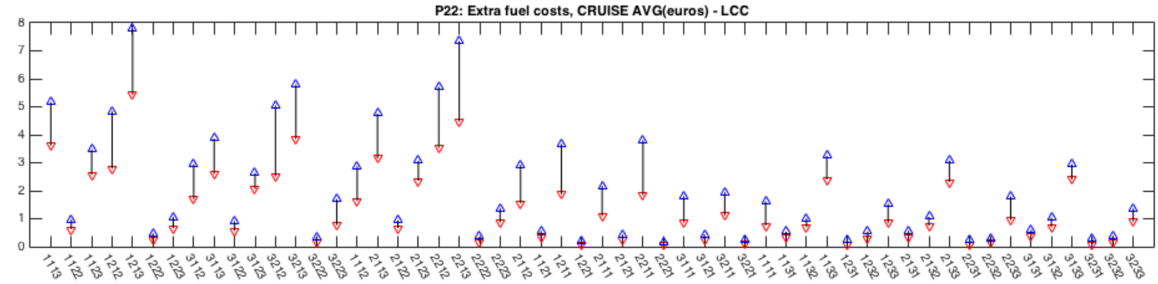

P22: Extra fuel costs, AMAN SD(euros) - LCC

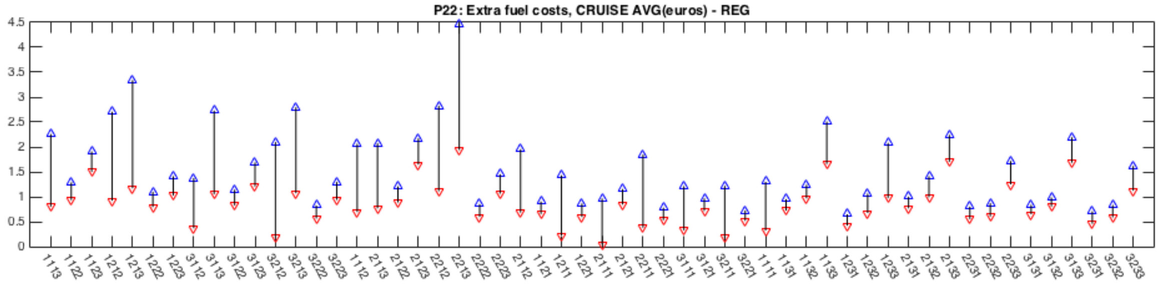

P22: Extra fuel costs, AMAN SD(euros) - REG

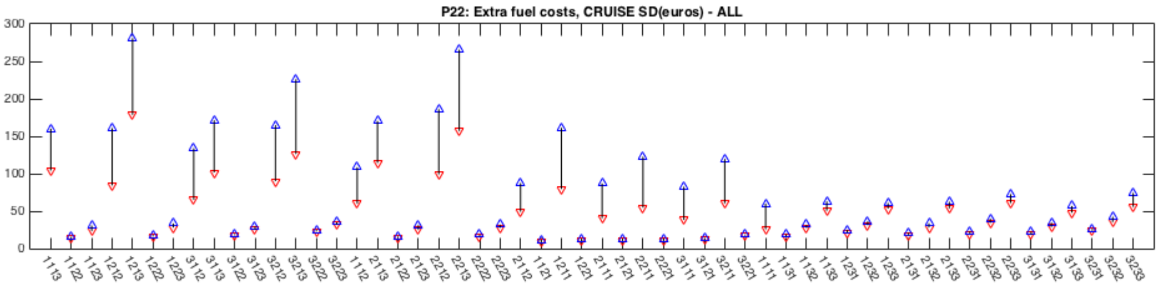

P22: Extra fuel costs, CRUISE AVG(euros) - ALL

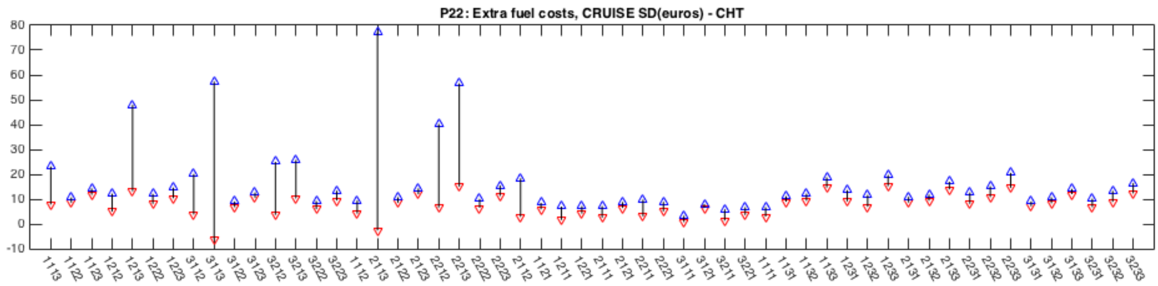

P22: Extra fuel costs, CRUISE AVG(euros) - CHT

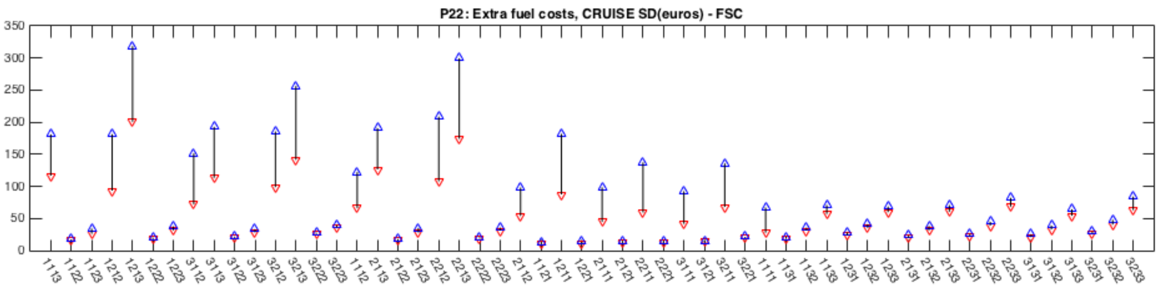

P22: Extra fuel costs, CRUISE AVG(euros) - FSC

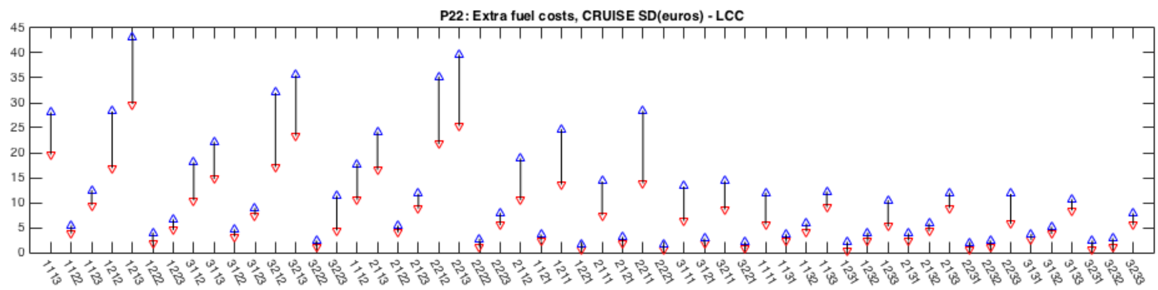

P22: Extra fuel costs, CRUISE AVG(euros) - LCC

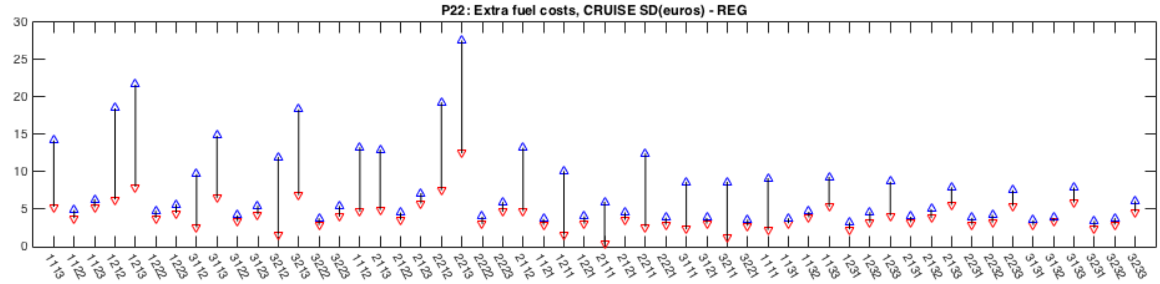

P22: Extra fuel costs, CRUISE AVG(euros) - REG

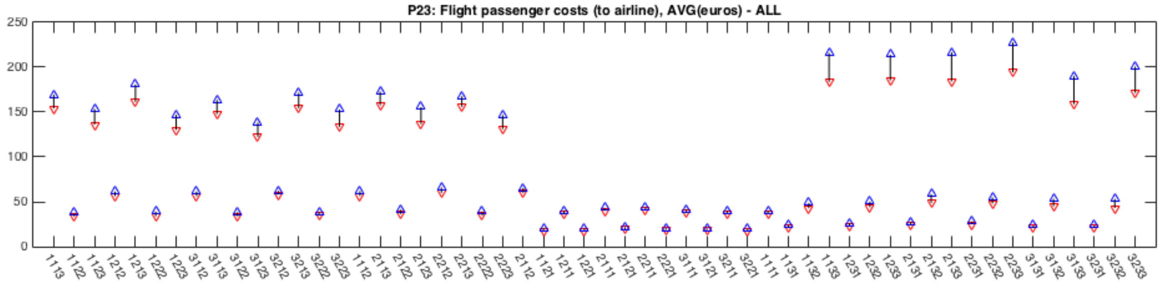

P22: Extra fuel costs, CRUISE SD(euros) - ALL

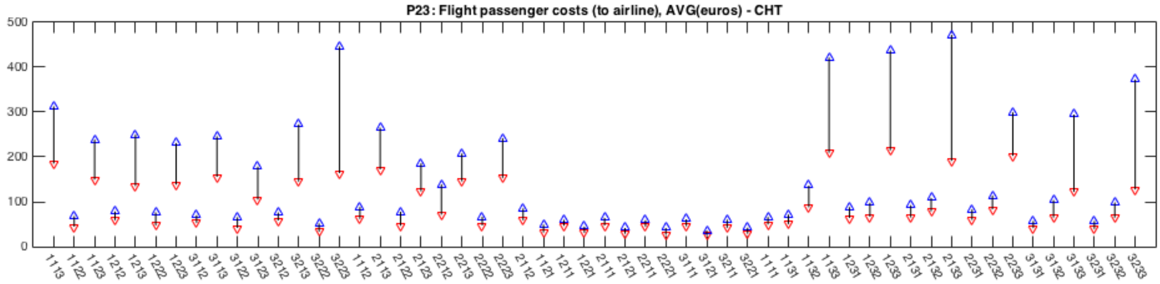

P22: Extra fuel costs, CRUISE SD(euros) - CHT

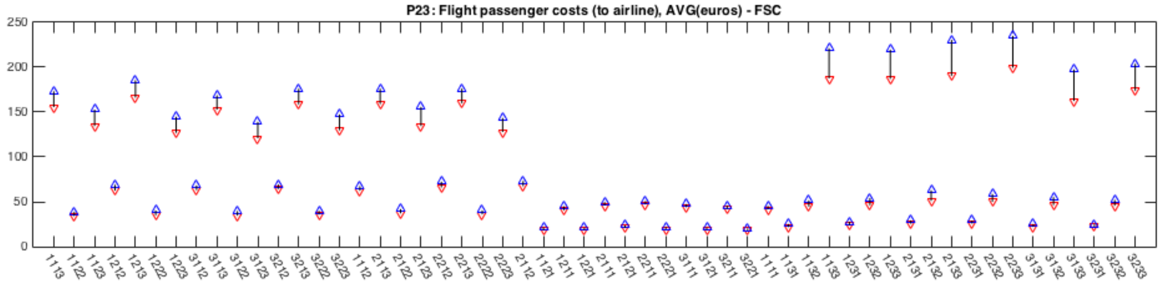

P22: Extra fuel costs, CRUISE SD(euros) - FSC

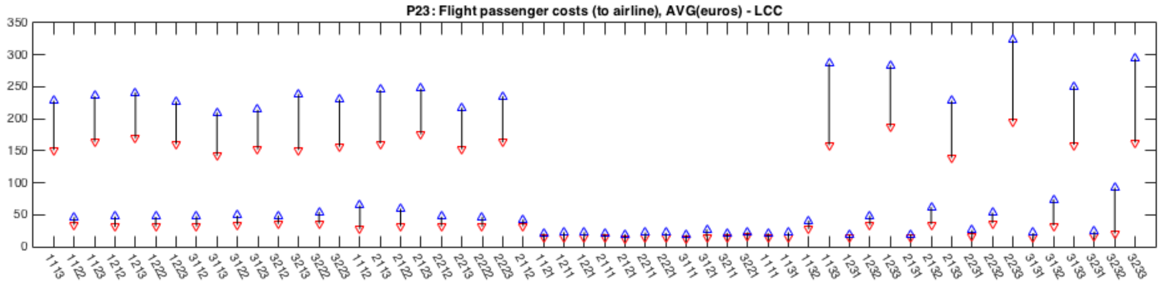

P22: Extra fuel costs, CRUISE SD(euros) - LCC

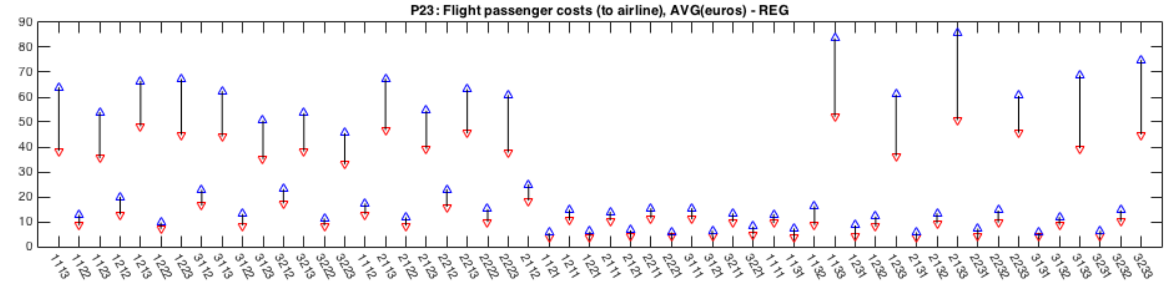

P22: Extra fuel costs, CRUISE SD(euros) - REG

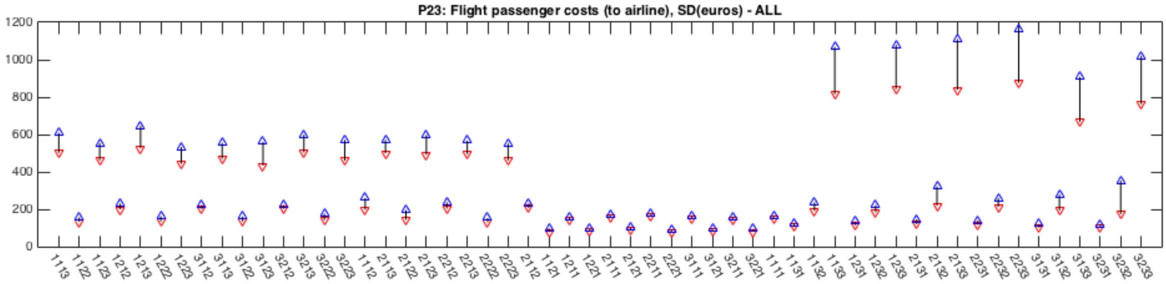

P23: Flight passenger costs (to airline), AVG(euros) - ALL

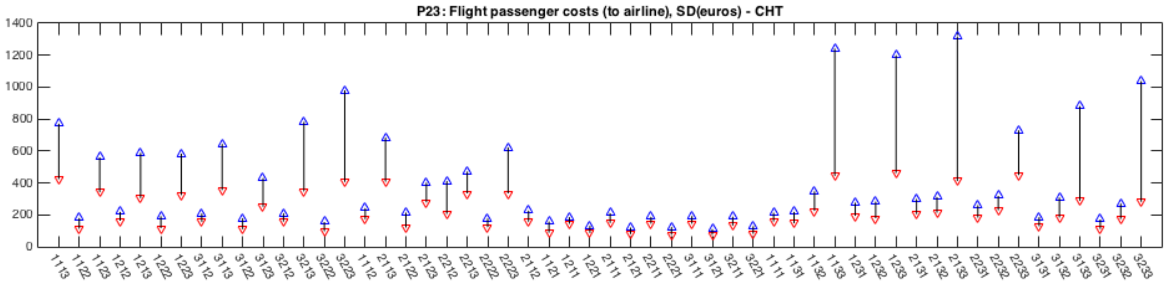

P23: Flight passenger costs (to airline), AVG(euros) - CHT

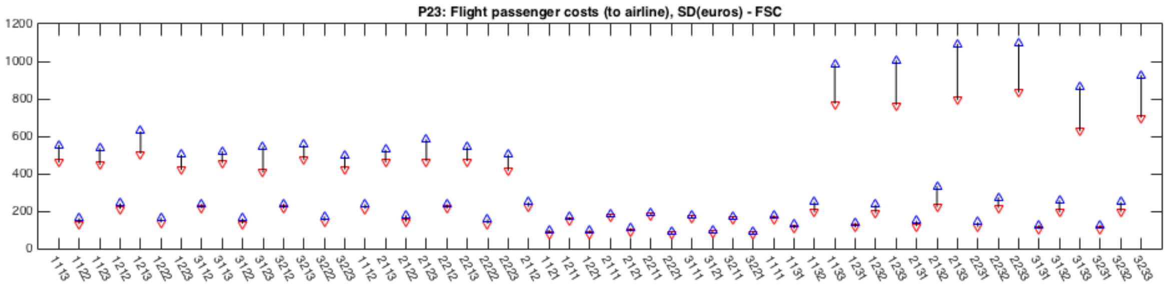

P23: Flight passenger costs (to airline), AVG(euros) - FSC

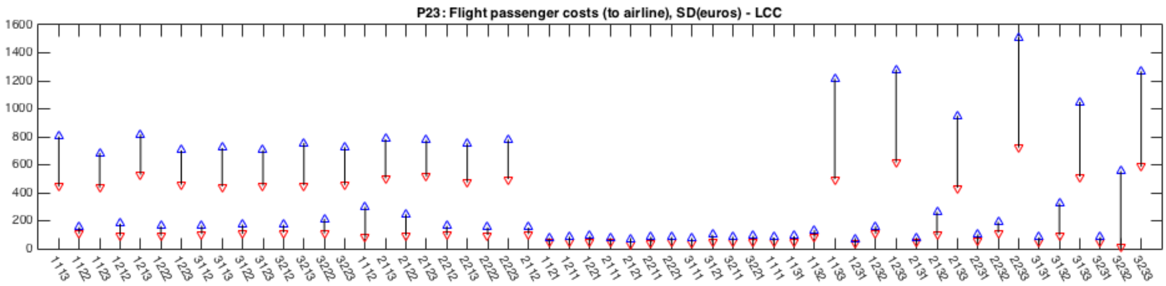

P23: Flight passenger costs (to airline), AVG(euros) - LCC

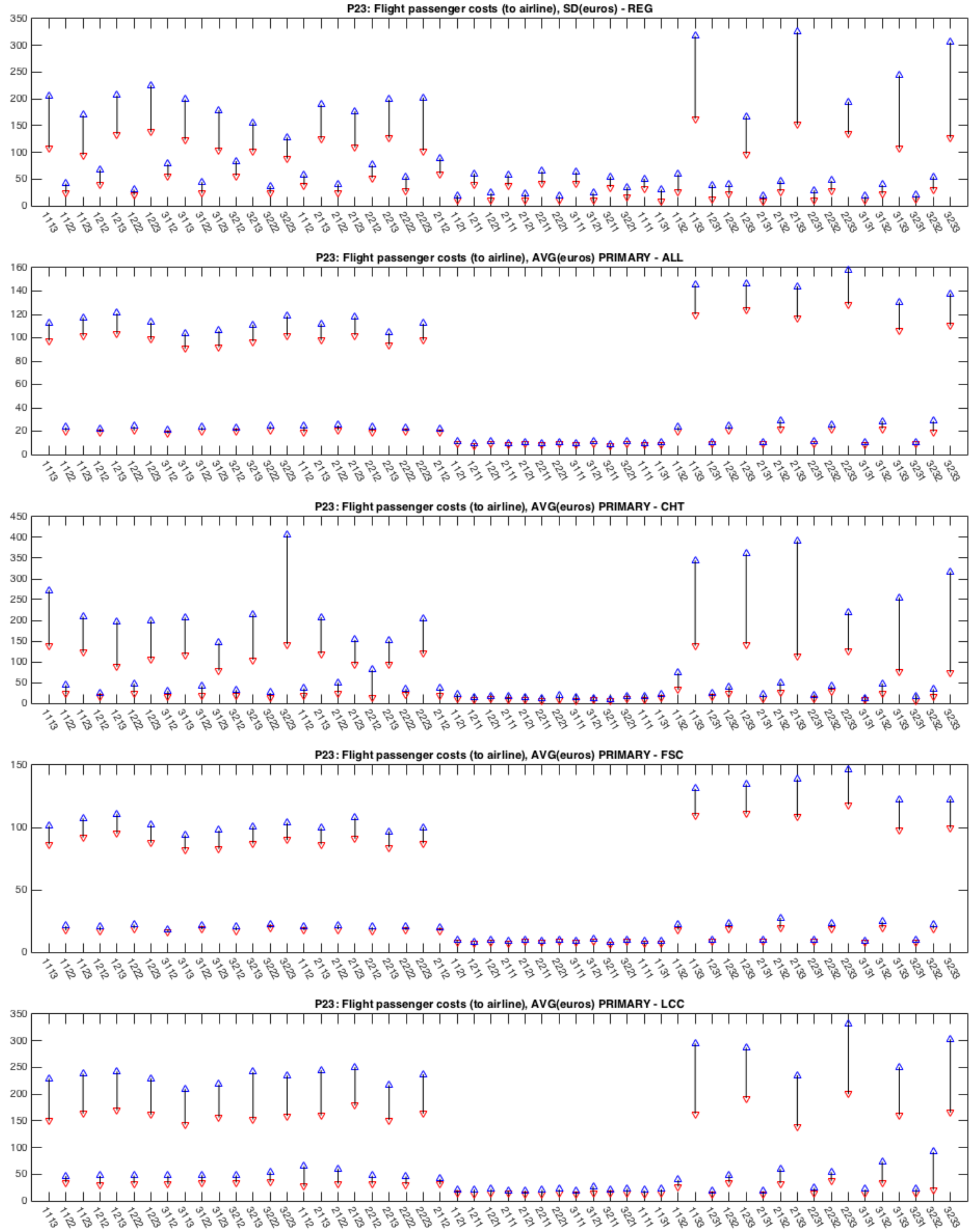

P23: Flight passenger costs (to airline), AVG(euros) - REG

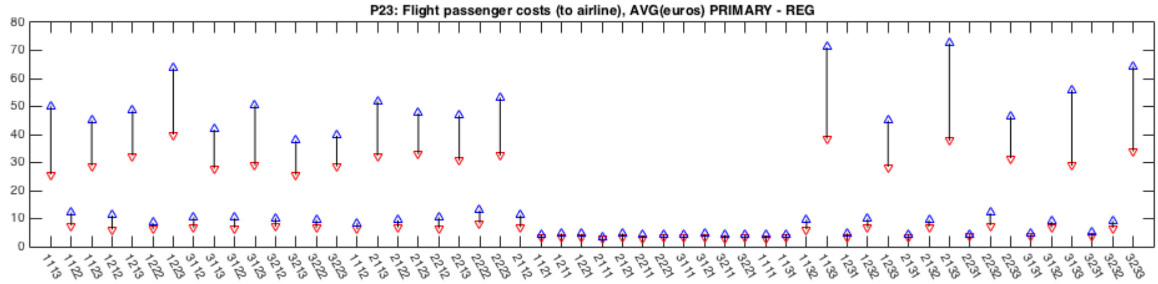

P23: Flight passenger costs (to airline), SD(euros) - ALL

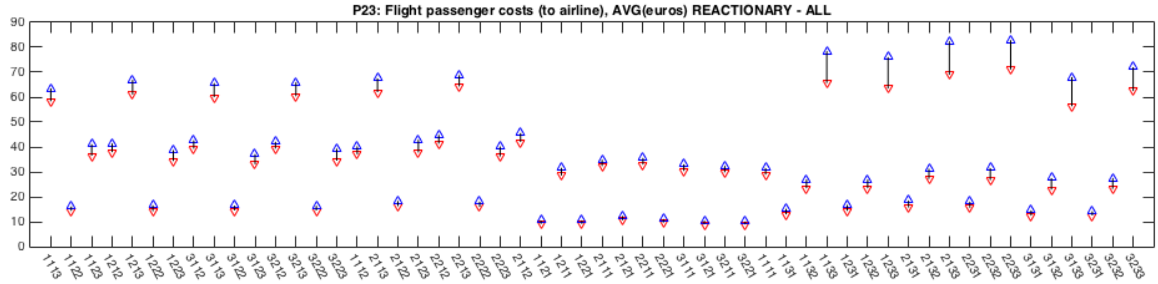

P23: Flight passenger costs (to airline), SD(euros) - CHT

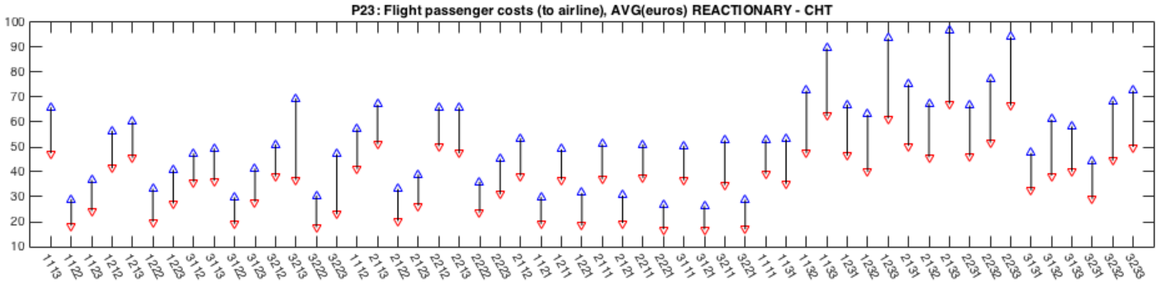

P23: Flight passenger costs (to airline), SD(euros) - FSC

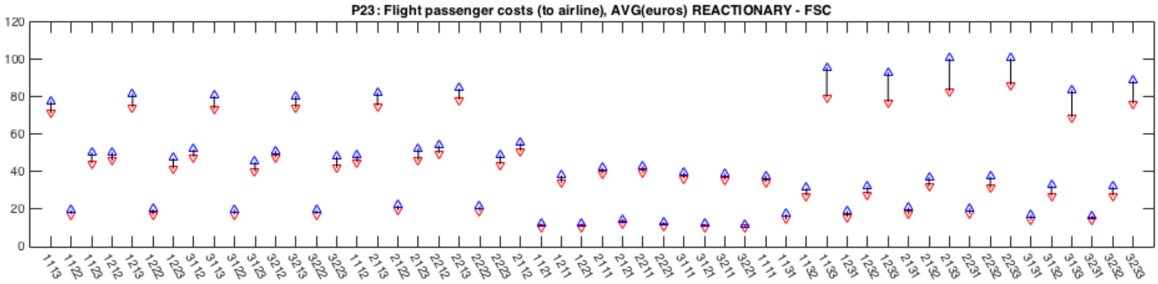

P23: Flight passenger costs (to airline), SD(euros) - LCC

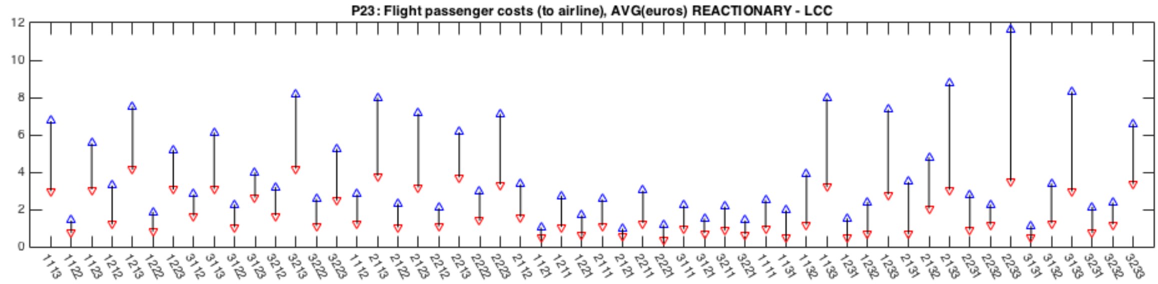

P23: Flight passenger costs (to airline), SD(euros) - REG
P23: Flight passenger costs (to airline), AVG(euros) PRIMARY - ALL
P23: Flight passenger costs (to airline), AVG(euros) PRIMARY - CHT
P23: Flight passenger costs (to airline), AVG(euros) PRIMARY - FSC
P23: Flight passenger costs (to airline), AVG(euros) PRIMARY - LCC

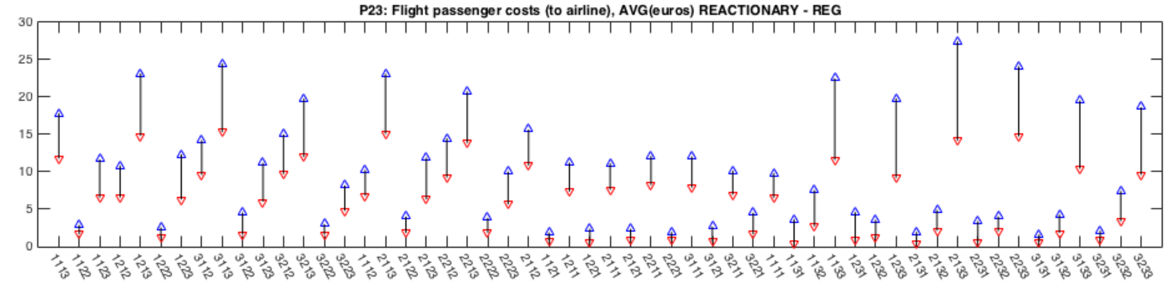

P23: Flight passenger costs (to airline), AVG(euros) PRIMARY - REG

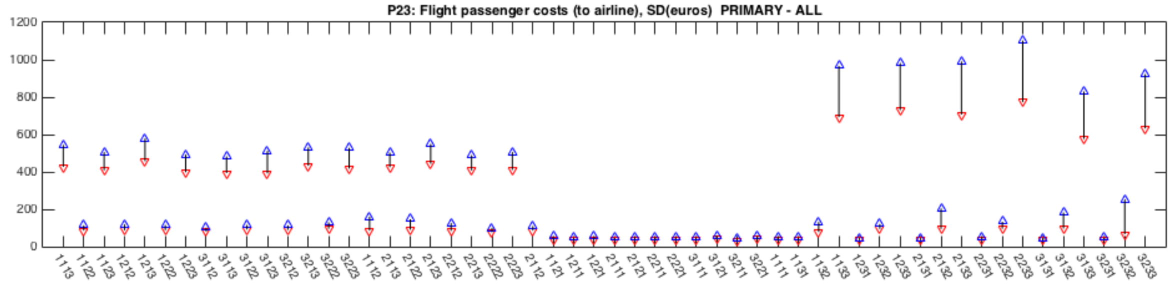

P23: Flight passenger costs (to airline), AVG(euros) REACTIONARY - ALL

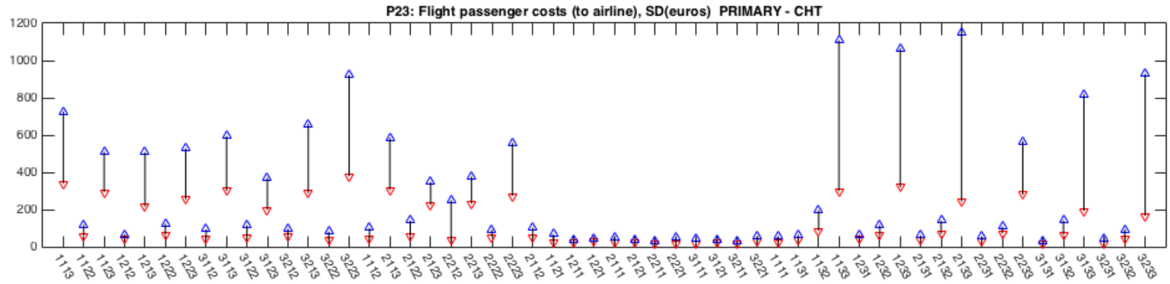

P23: Flight passenger costs (to airline), AVG(euros) REACTIONARY - CHT

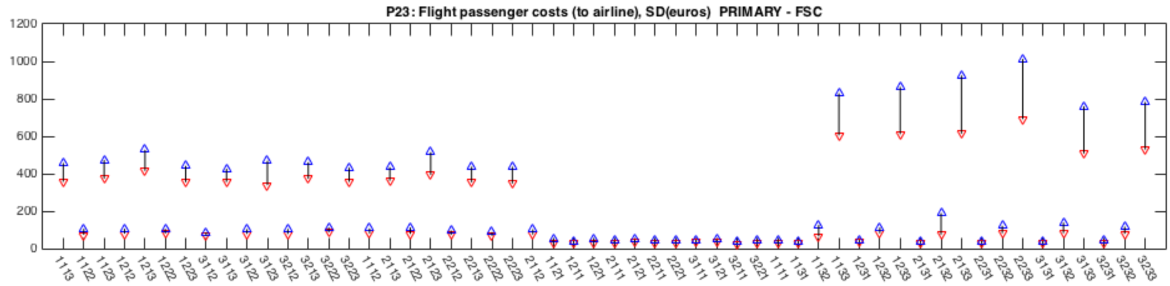

P23: Flight passenger costs (to airline), AVG(euros) REACTIONARY - FSC

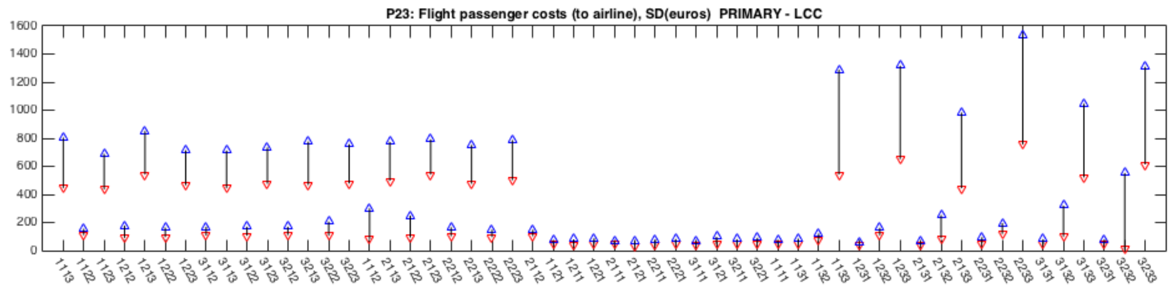

P23: Flight passenger costs (to airline), AVG(euros) REACTIONARY - LCC

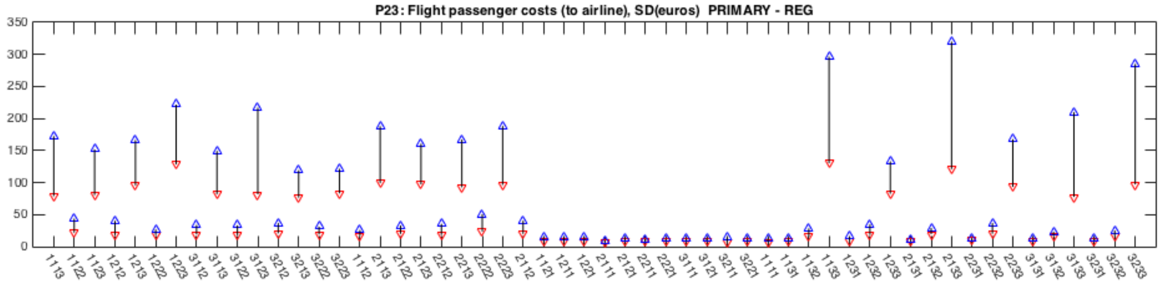

P23: Flight passenger costs (to airline), AVG(euros) REACTIONARY - REG

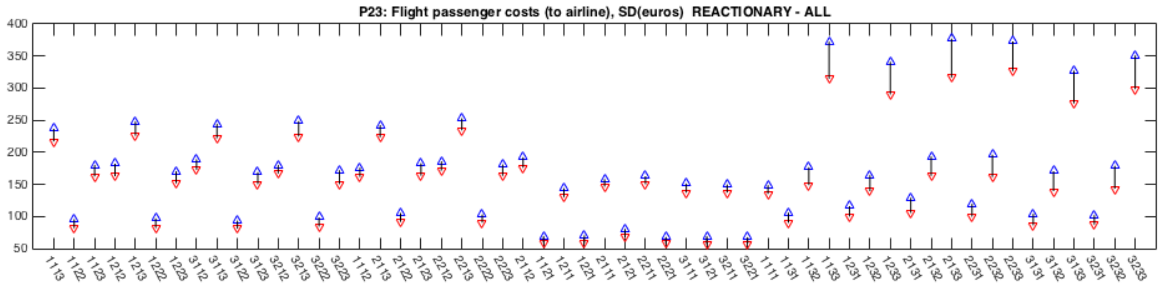

P23: Flight passenger costs (to airline), SD(euros) PRIMARY - ALL

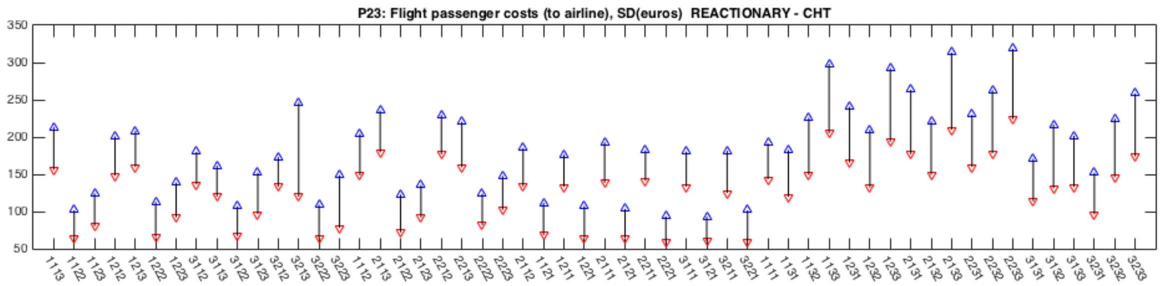

P23: Flight passenger costs (to airline), SD(euros) PRIMARY - CHT

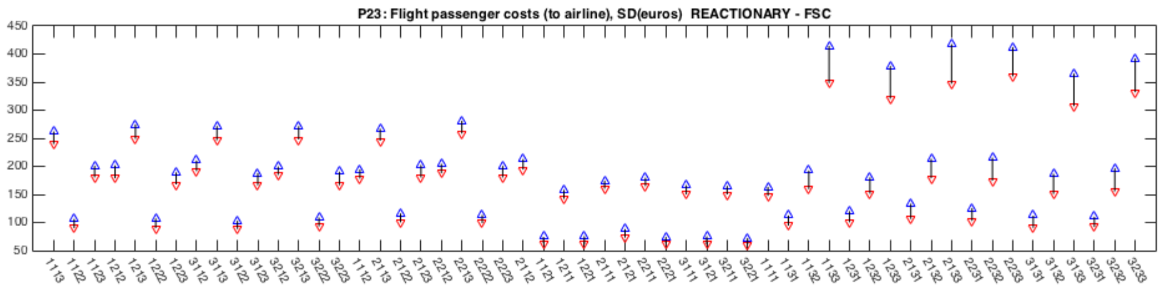

P23: Flight passenger costs (to airline), SD(euros) PRIMARY - FSC

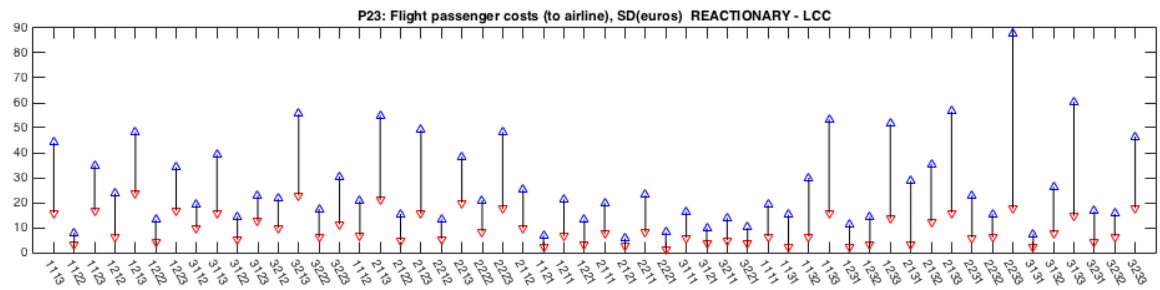

P23: Flight passenger costs (to airline), SD(euros) PRIMARY - LCC

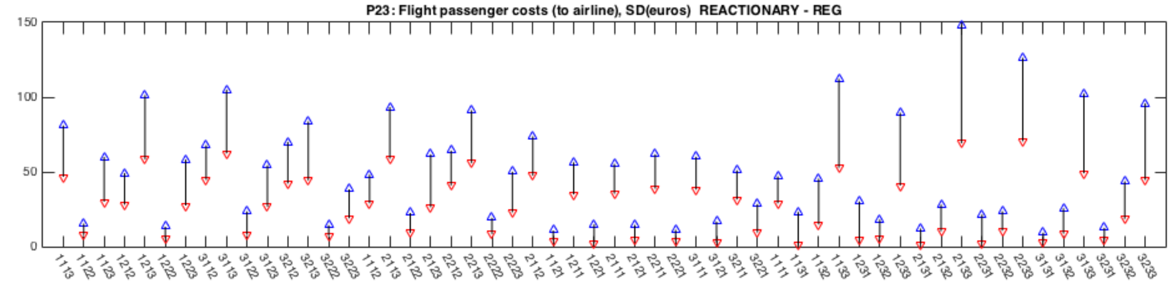

P23: Flight passenger costs (to airline), SD(euros) PRIMARY - REG

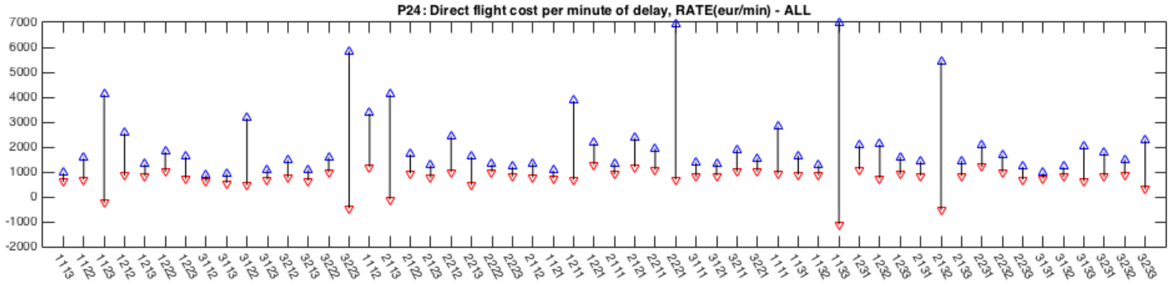

P23: Flight passenger costs (to airline), SD(euros) REACTIONARY - ALL

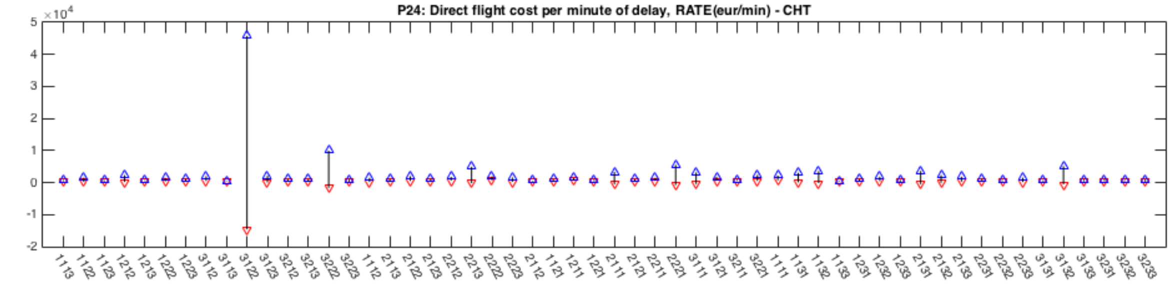

P23: Flight passenger costs (to airline), SD(euros) REACTIONARY - CHT

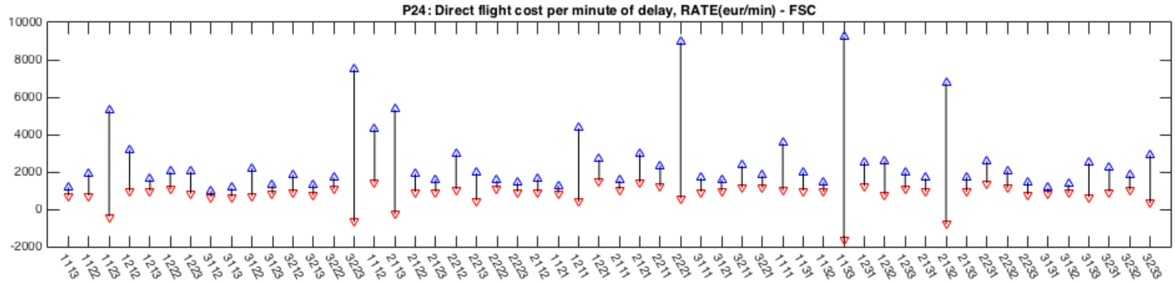

P23: Flight passenger costs (to airline), SD(euros) REACTIONARY - FSC

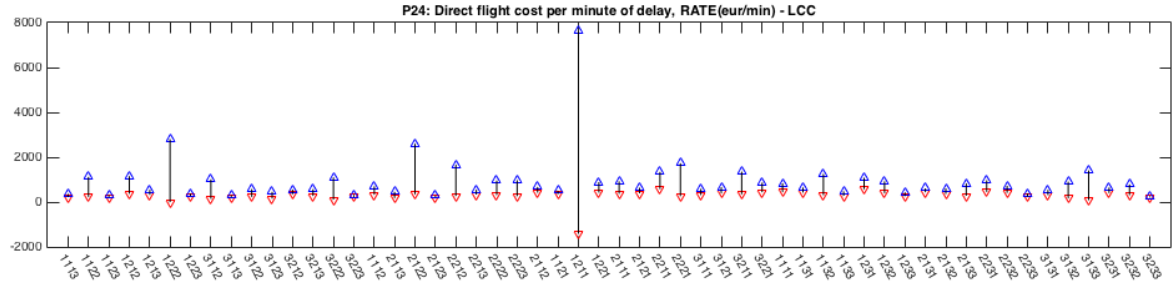

P23: Flight passenger costs (to airline), SD(euros) REACTIONARY - LCC

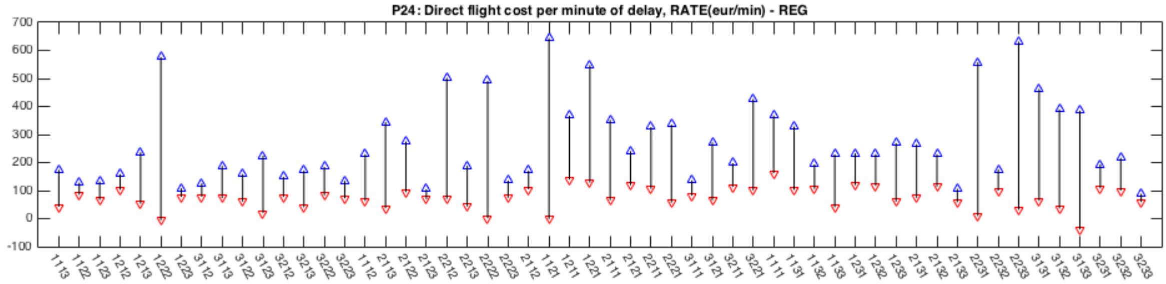

P23: Flight passenger costs (to airline), SD(euros) REACTIONARY - REG

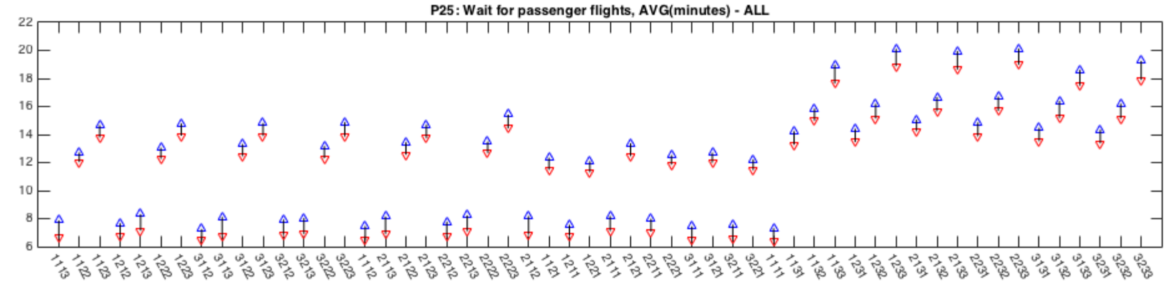

P24: Direct flight cost per minute of delay, RATE(eur/min) - ALL

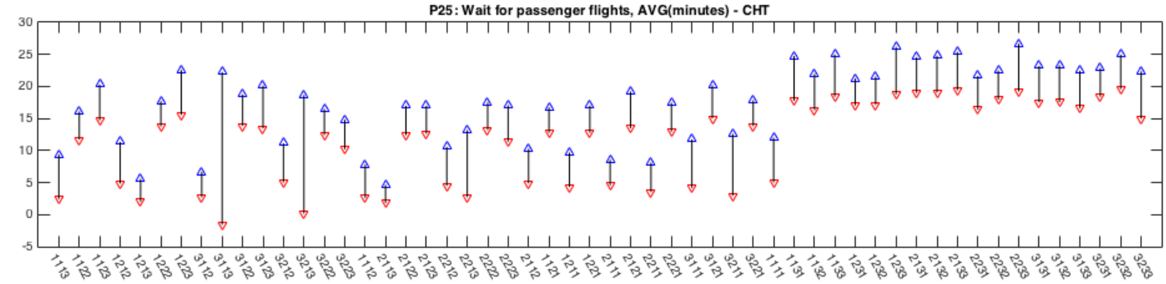

P24: Direct flight cost per minute of delay, RATE(eur/min) - CHT

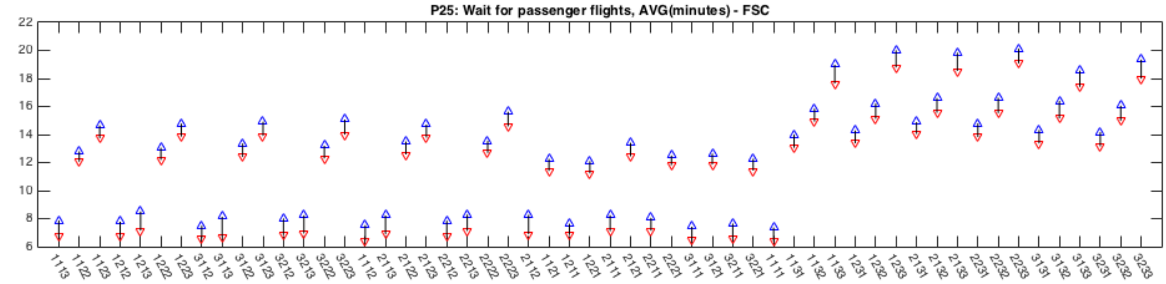

P24: Direct flight cost per minute of delay, RATE(eur/min) - FSC

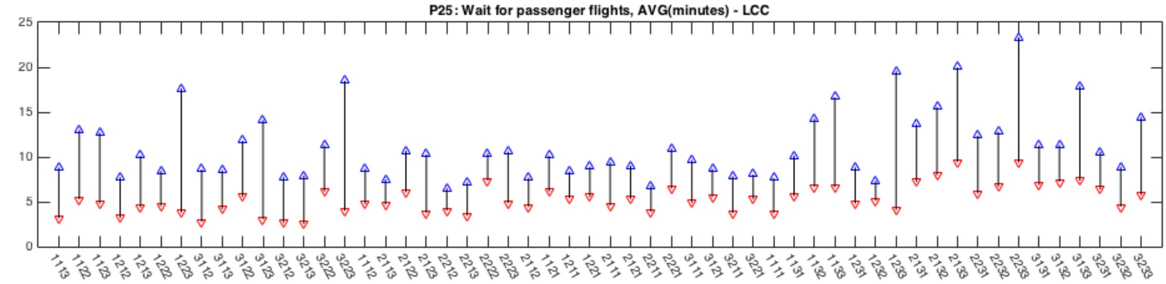

P24: Direct flight cost per minute of delay, RATE(eur/min) - LCC

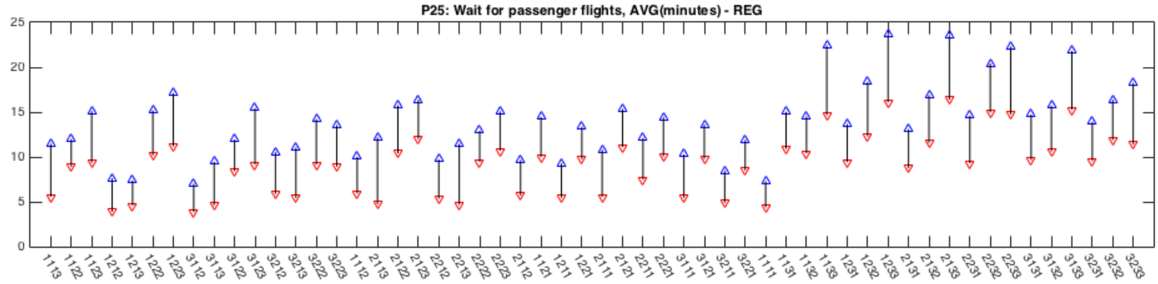

P24: Direct flight cost per minute of delay, RATE(eur/min) - REG

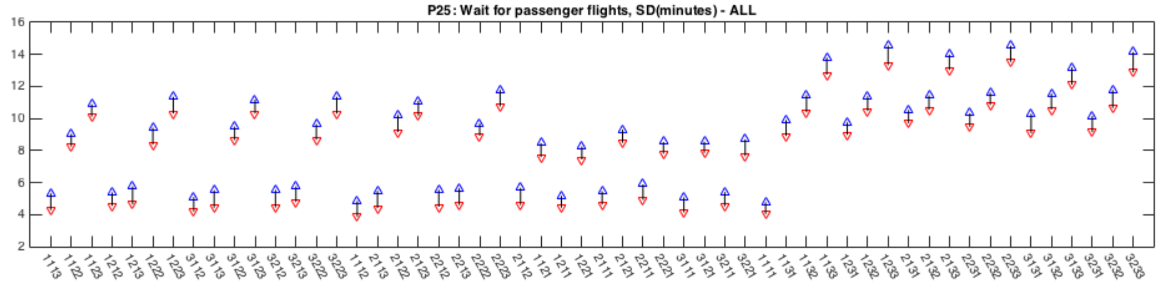

P25: Wait for passenger flights, AVG(minutes) - ALL

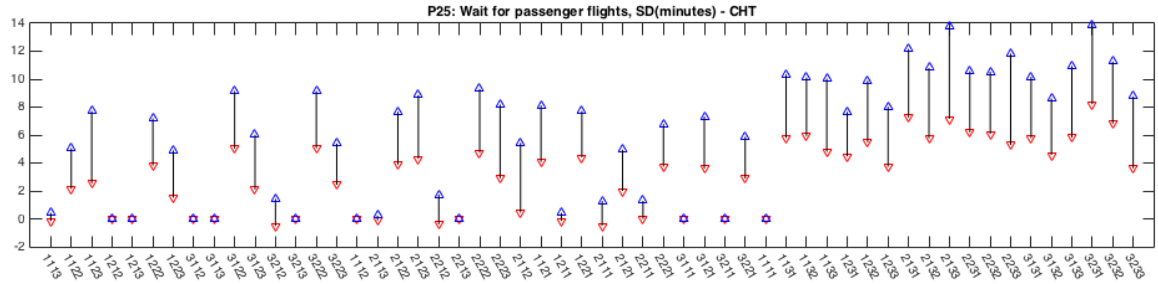

P25: Wait for passenger flights, AVG(minutes) - CHT

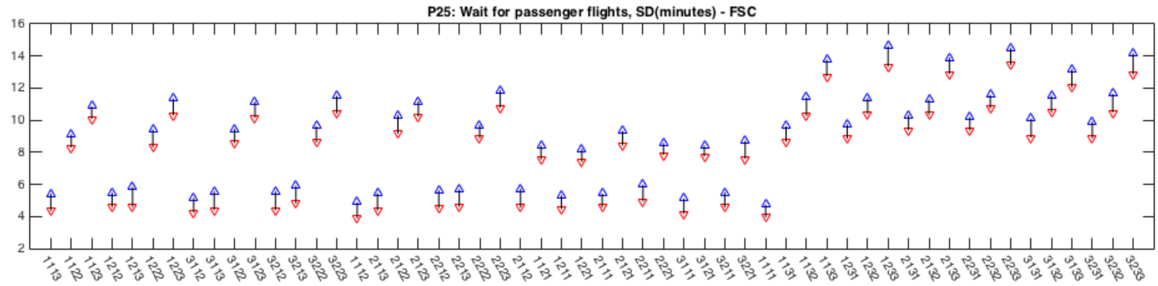

P25: Wait for passenger flights, AVG(minutes) - FSC

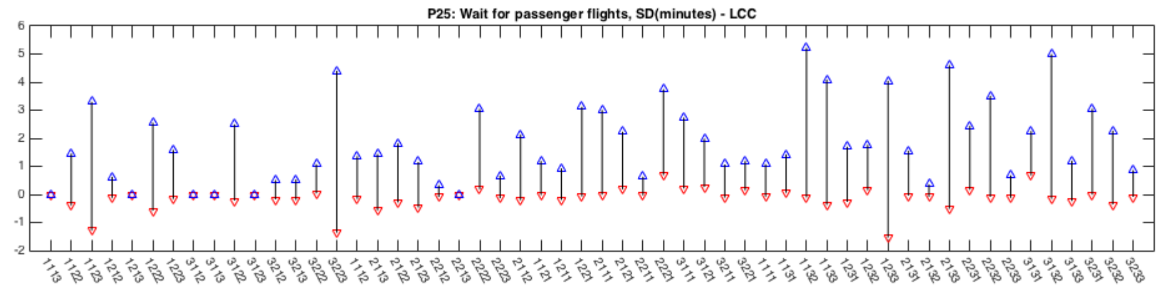

P25: Wait for passenger flights, AVG(minutes) - LCC

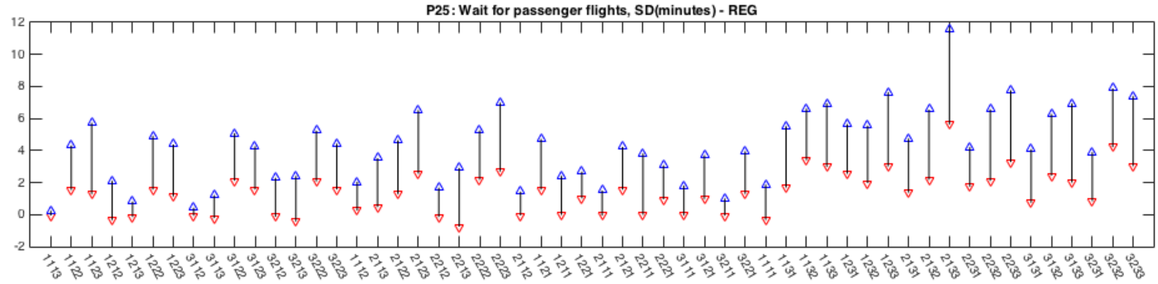

P25: Wait for passenger flights, AVG(minutes) - REG

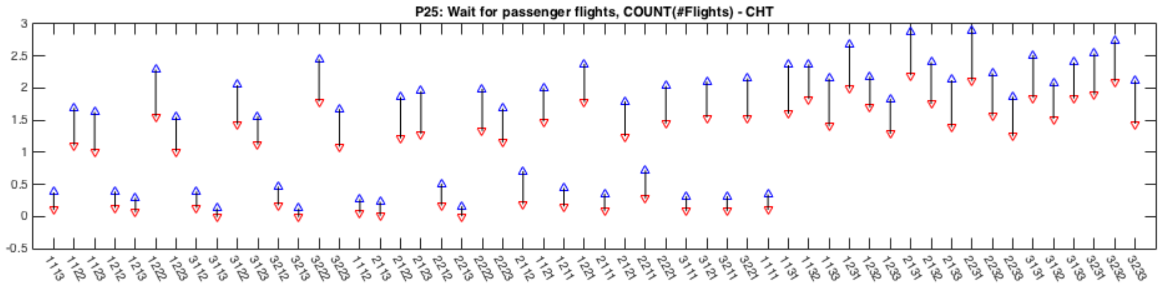

P25: Wait for passenger flights, SD(minutes) - ALL

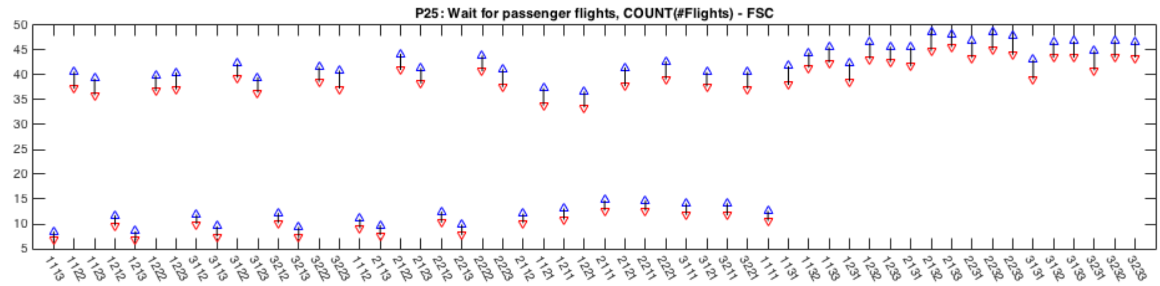

P25: Wait for passenger flights, SD(minutes) - CHT

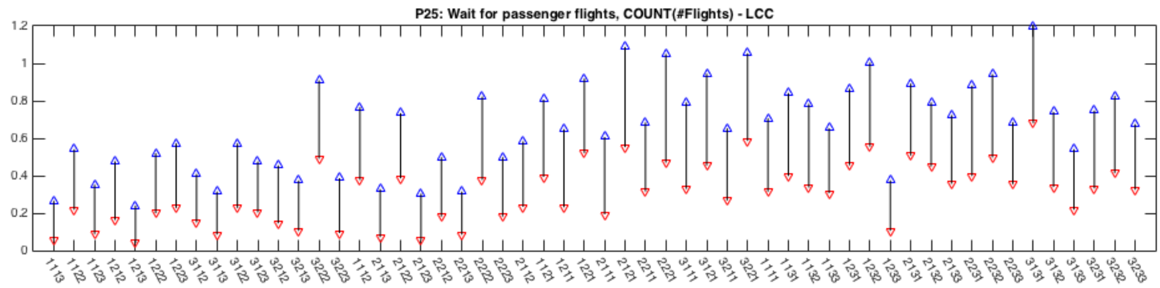

P25: Wait for passenger flights, SD(minutes) - FSC

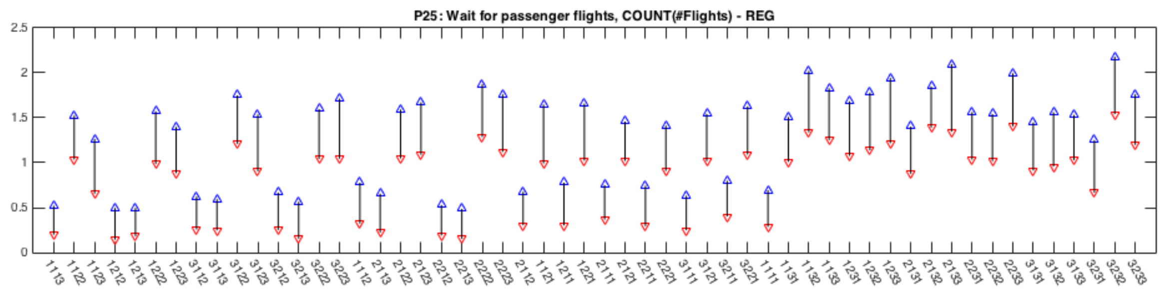

P25: Wait for passenger flights, SD(minutes) - LCC

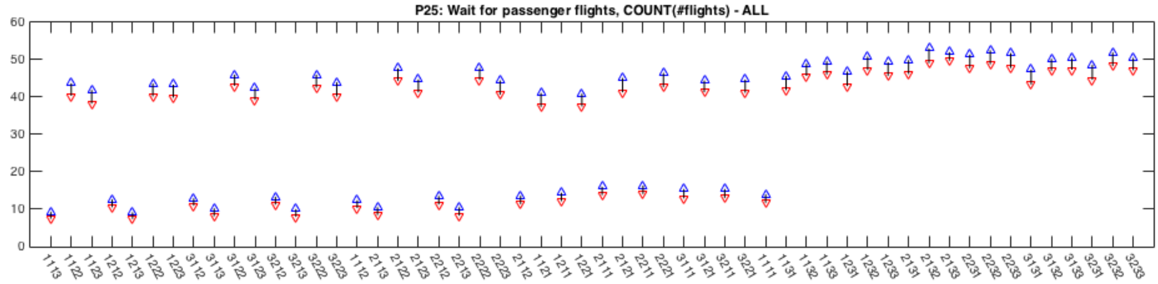

P25: Wait for passenger flights, SD(minutes) - REG

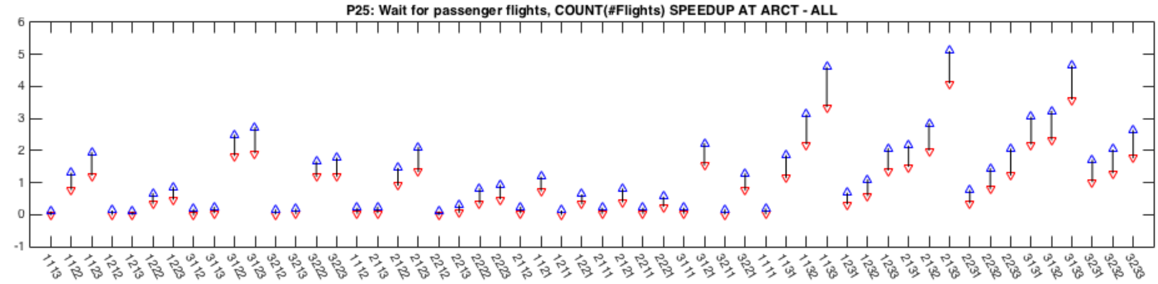

P25: Wait for passenger flights, COUNT(#Flights) - CHT

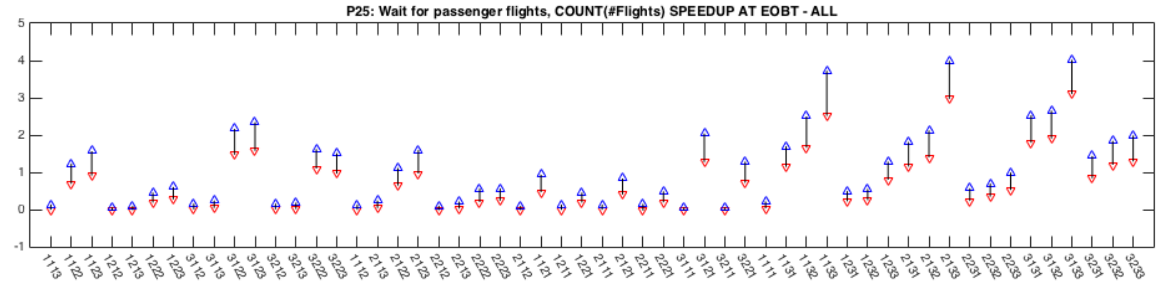

P25: Wait for passenger flights, COUNT(#Flights) - FSC

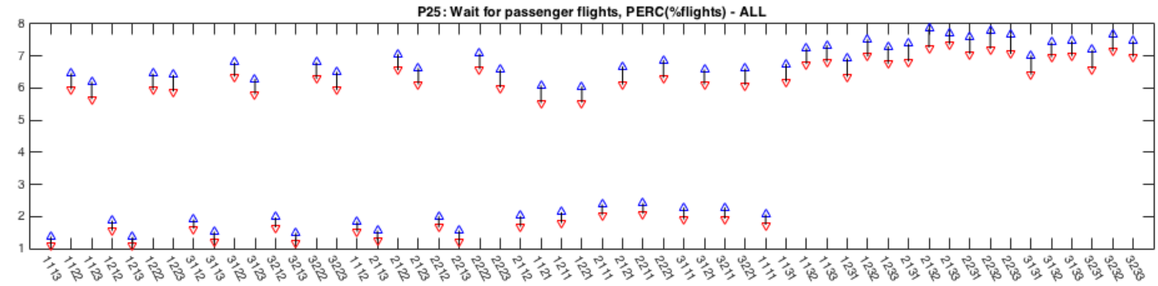

P25: Wait for passenger flights, COUNT(#Flights) - LCC

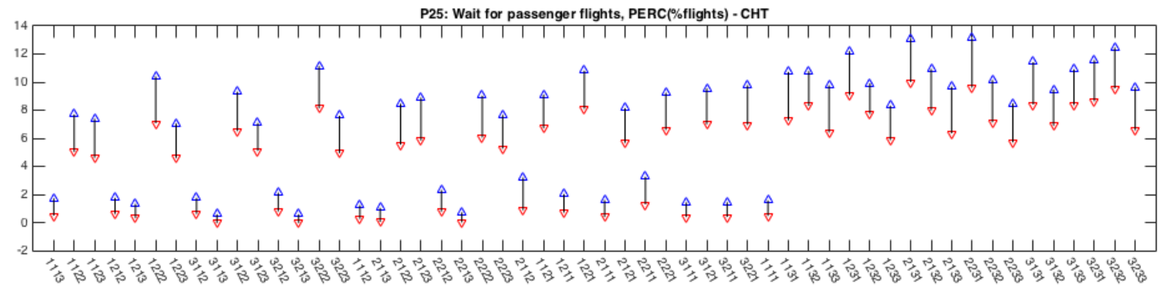

P25: Wait for passenger flights, COUNT(#Flights) - REG

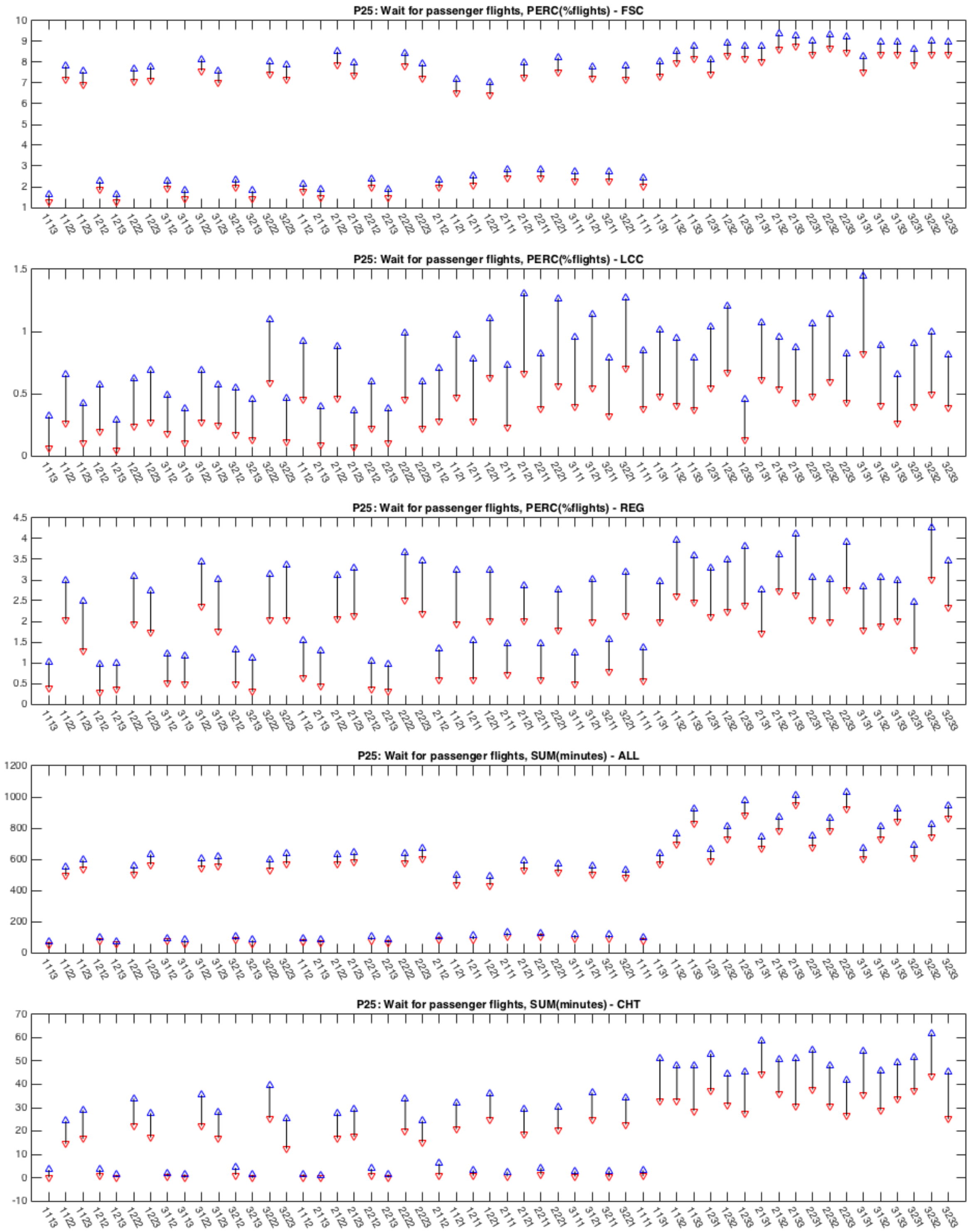

P25: Wait for passenger flights, COUNT(#flights) - ALL


P25: Wait for passenger flights, COUNT(#Flights) SPEEDUP AT ARCT - ALL

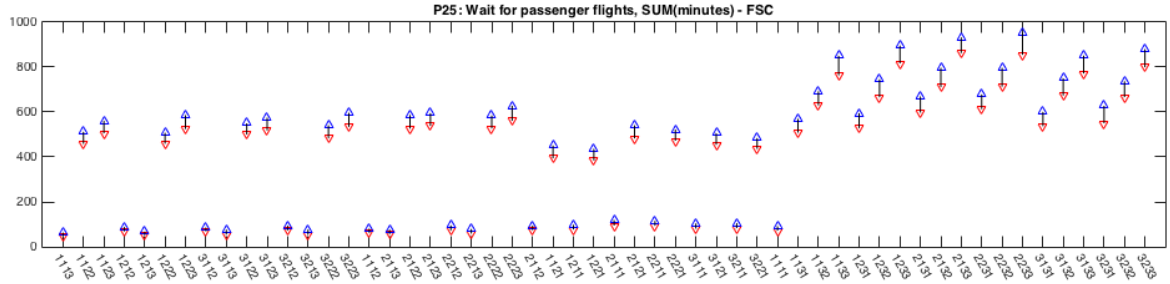

P25: Wait for passenger flights, COUNT(#Flights) SPEEDUP AT EOBT - ALL


P25: Wait for passenger flights, PERC(%flights) - ALL

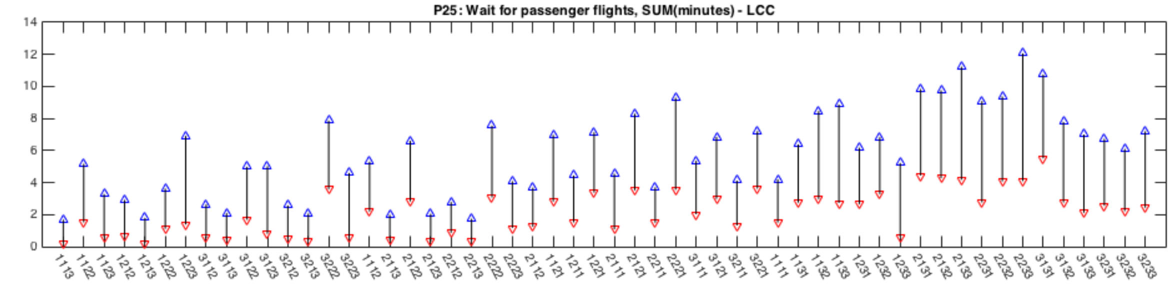

P25: Wait for passenger flights, PERC(%flights) - CHT


P25: Wait for passenger flights, PERC(%flights) - FSC
P25: Wait for passenger flights, PERC(%flights) - LCC
P25: Wait for passenger flights, PERC(%flights) - REG
P25: Wait for passenger flights, SUM(minutes) - ALL
P25: Wait for passenger flights, SUM(minutes) - CHT

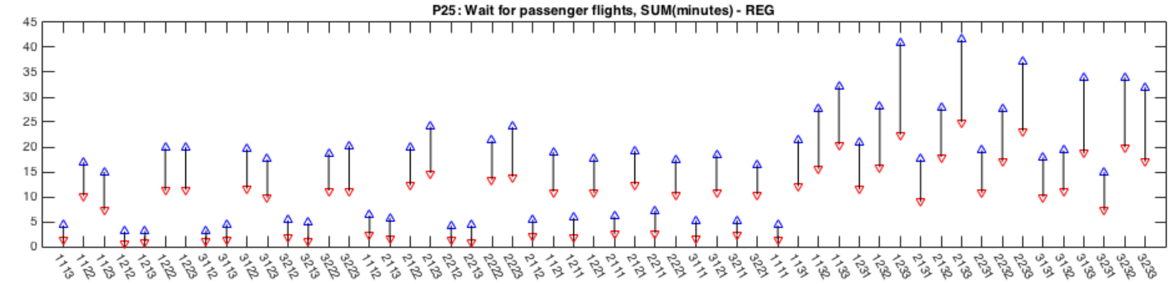
P25: Wait for passenger flights, SUM(minutes) - FSC



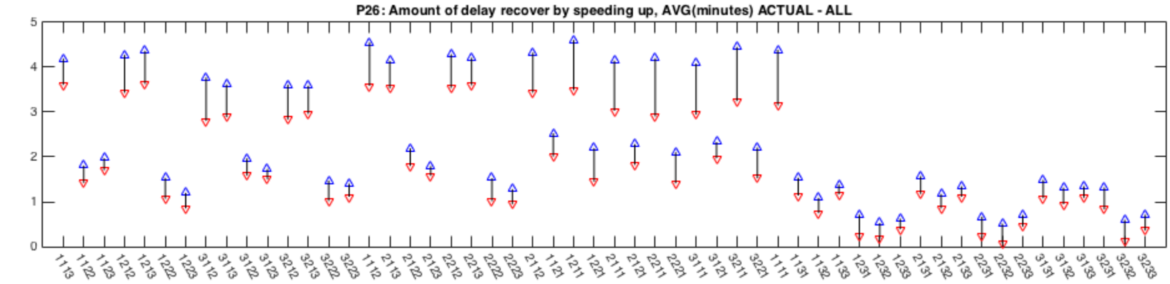
P25: Wait for passenger flights, SUM(minutes) - LCC



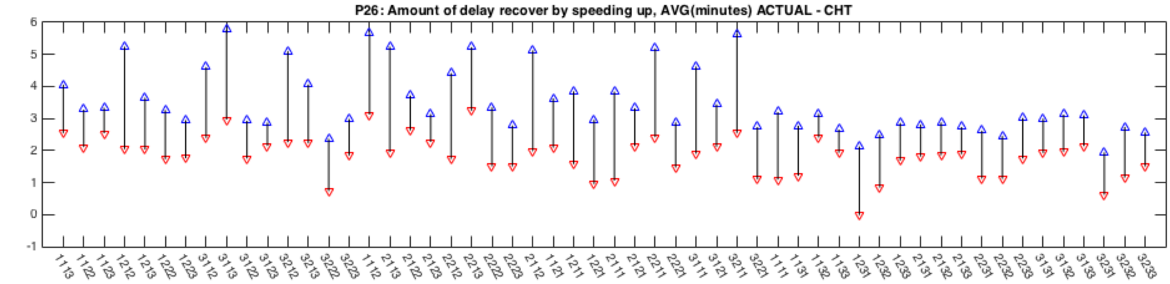
P25: Wait for passenger flights, SUM(minutes) - REG

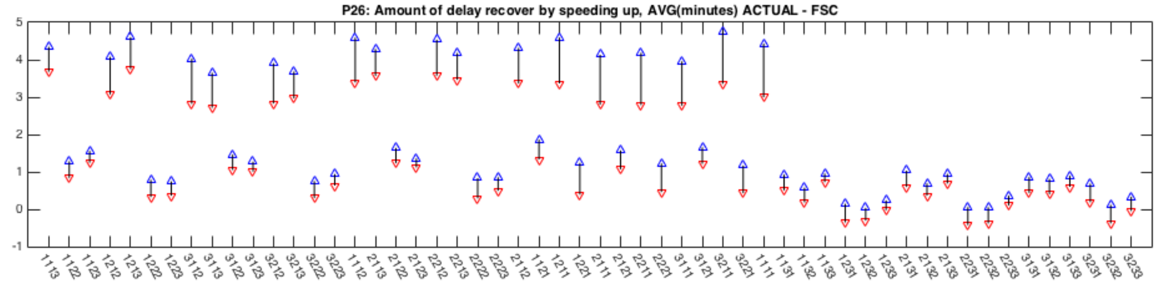


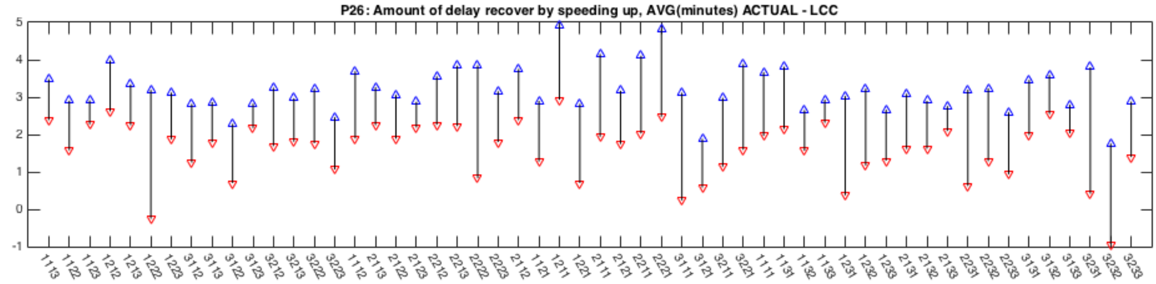
P26: Amount of delay recover by speeding up, AVG(minutes) ACTUAL - ALL

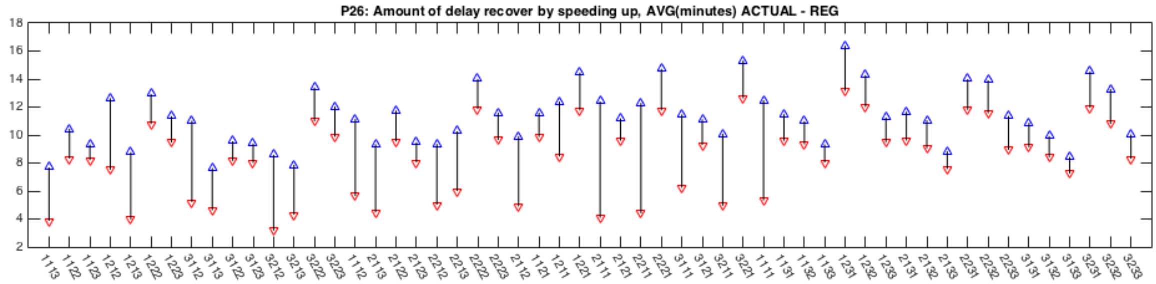


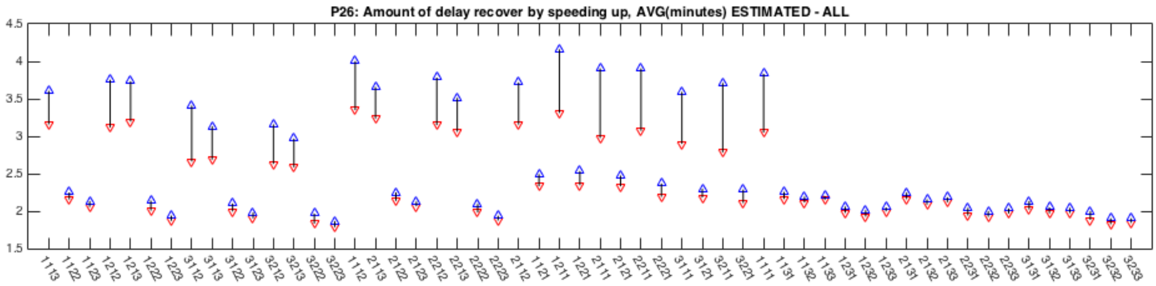
P26: Amount of delay recover by speeding up, AVG(minutes) ACTUAL - CHT

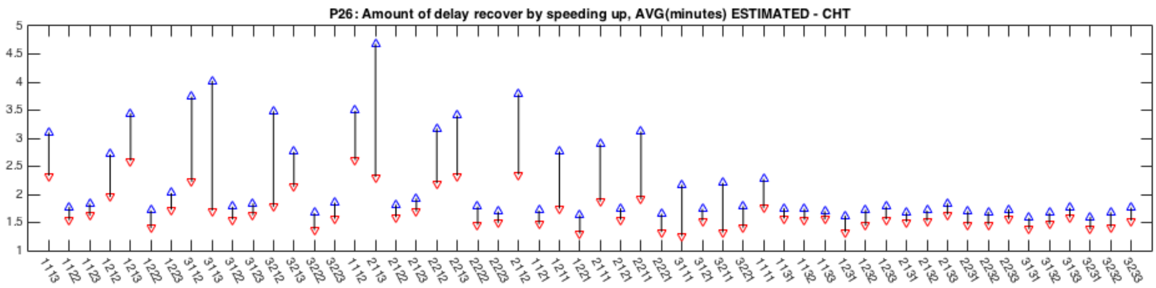


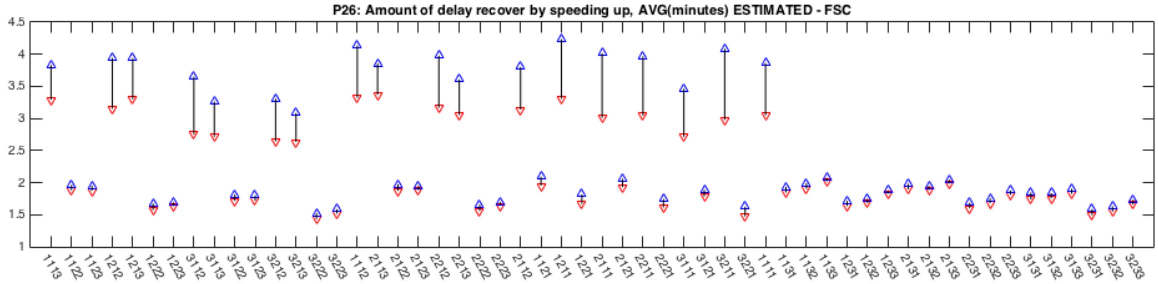

P26: Amount of delay recover by speeding up, AVG(minutes) ACTUAL - FSC

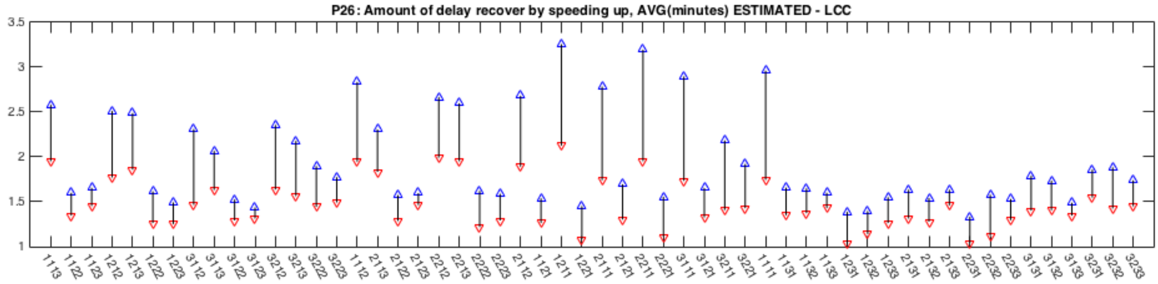

P26: Amount of delay recover by speeding up, AVG(minutes) ACTUAL - LCC

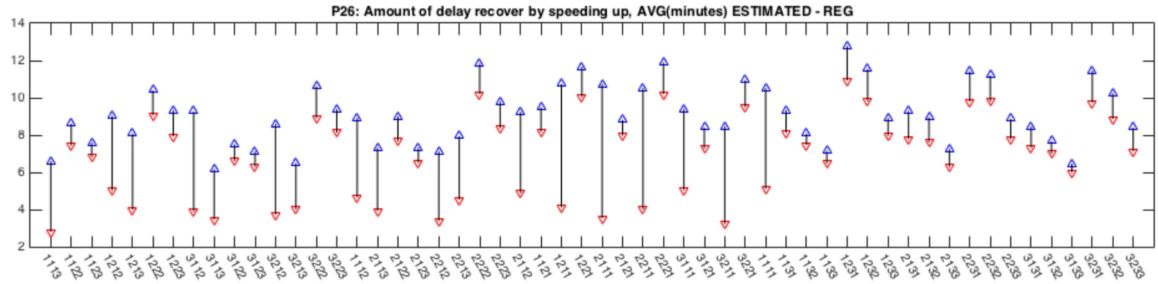

P26: Amount of delay recover by speeding up, AVG(minutes) ACTUAL - REG

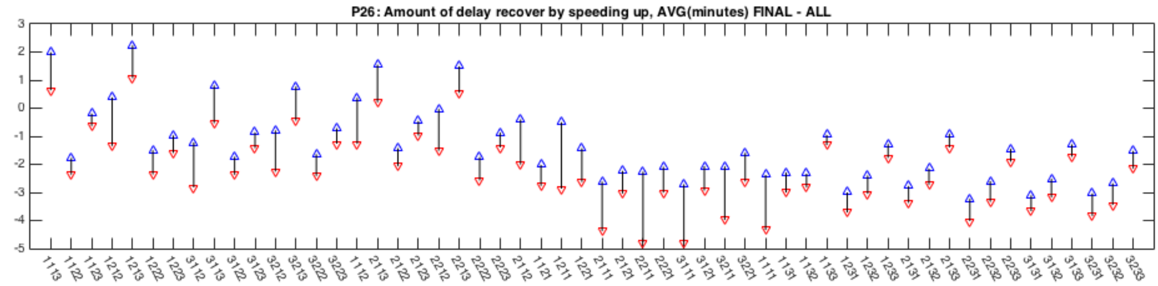

P26: Amount of delay recover by speeding up, AVG(minutes) ESTIMATED - ALL

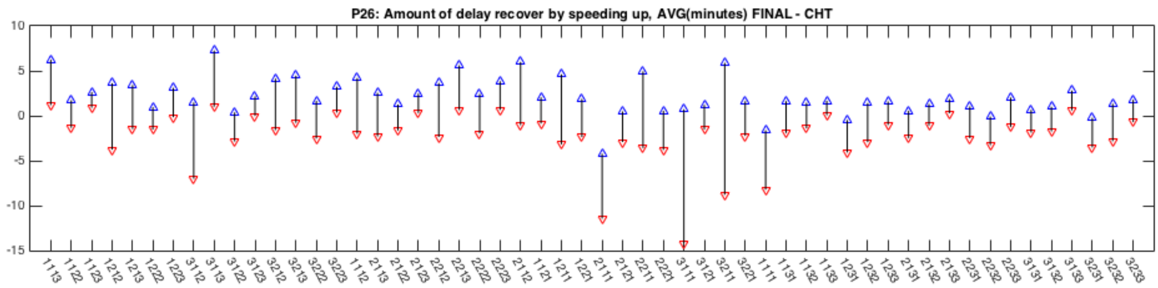

P26: Amount of delay recover by speeding up, AVG(minutes) ESTIMATED - CHT

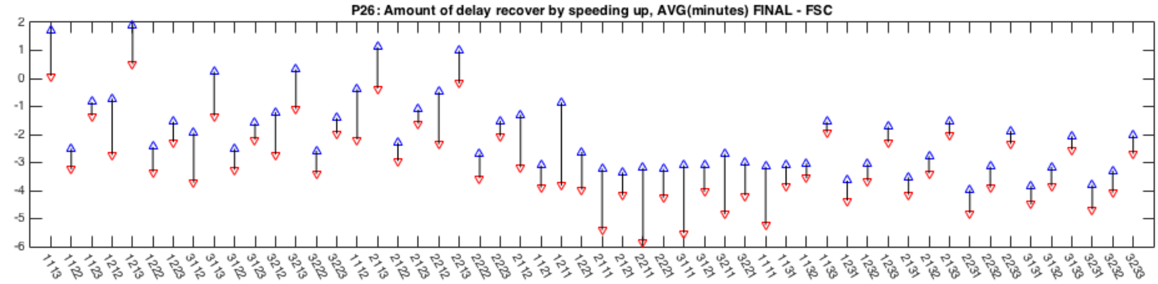

P26: Amount of delay recover by speeding up, AVG(minutes) ESTIMATED - FSC

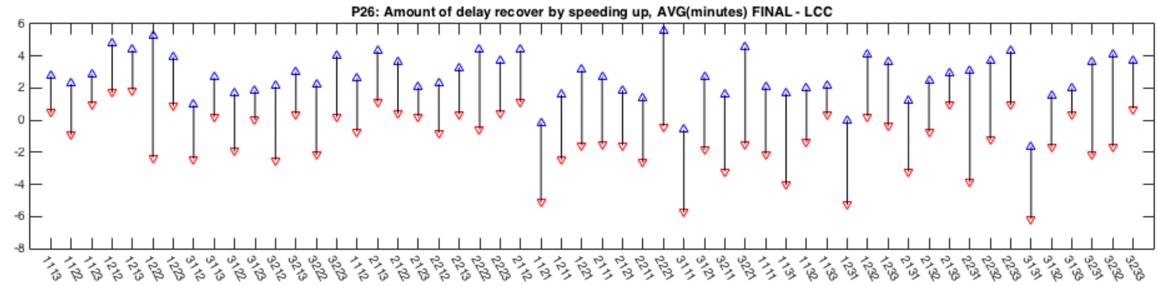

P26: Amount of delay recover by speeding up, AVG(minutes) ESTIMATED - LCC

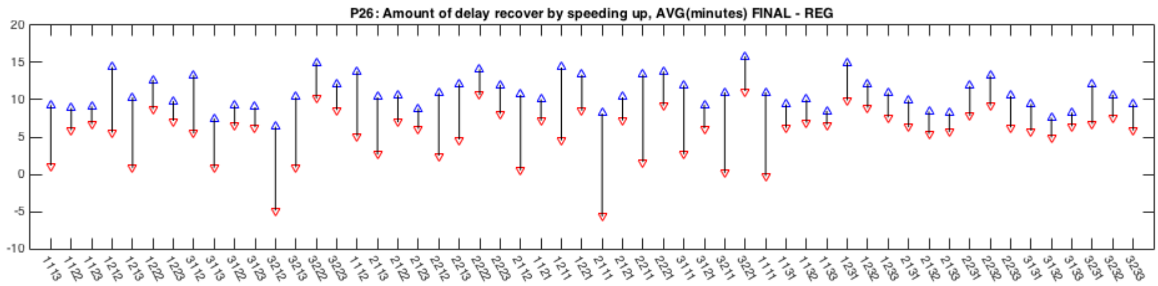

P26: Amount of delay recover by speeding up, AVG(minutes) ESTIMATED - REG

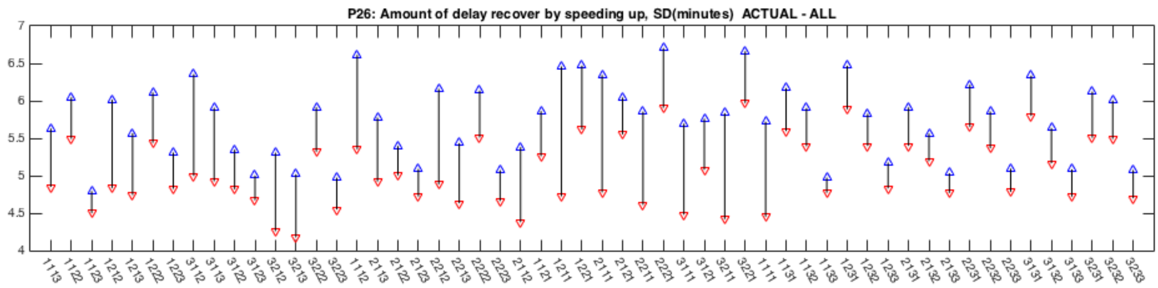

P26: Amount of delay recover by speeding up, AVG(minutes) FINAL - ALL

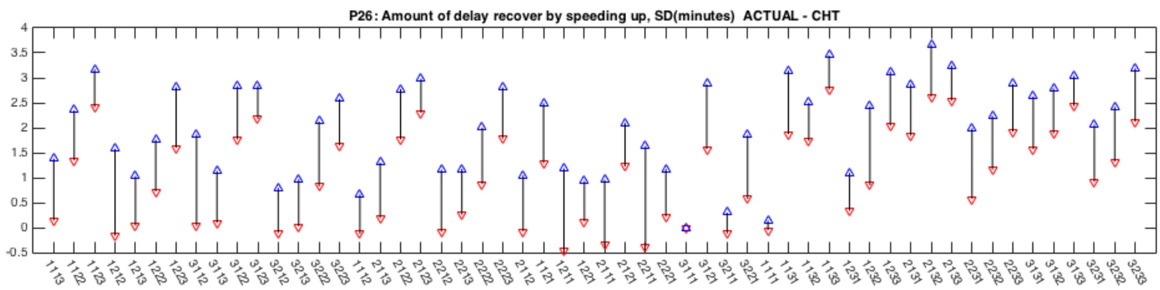

P26: Amount of delay recover by speeding up, AVG(minutes) FINAL - CHT


P26: Amount of delay recover by speeding up, AVG(minutes) FINAL - FSC

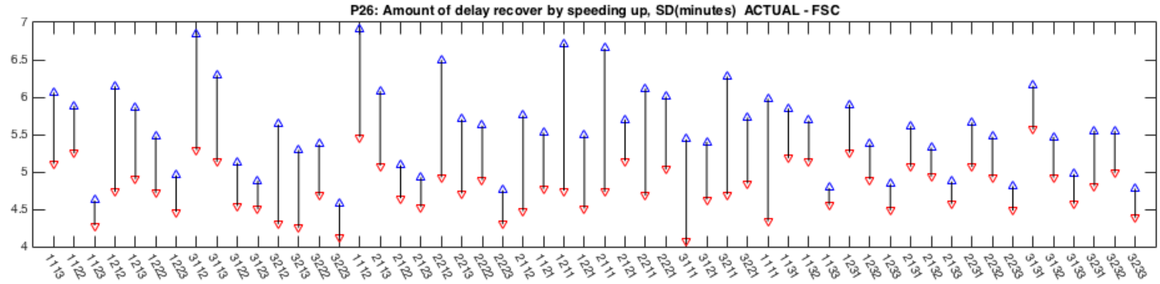

P26: Amount of delay recover by speeding up, AVG(minutes) FINAL - LCC


P26: Amount of delay recover by speeding up, AVG(minutes) FINAL - REG

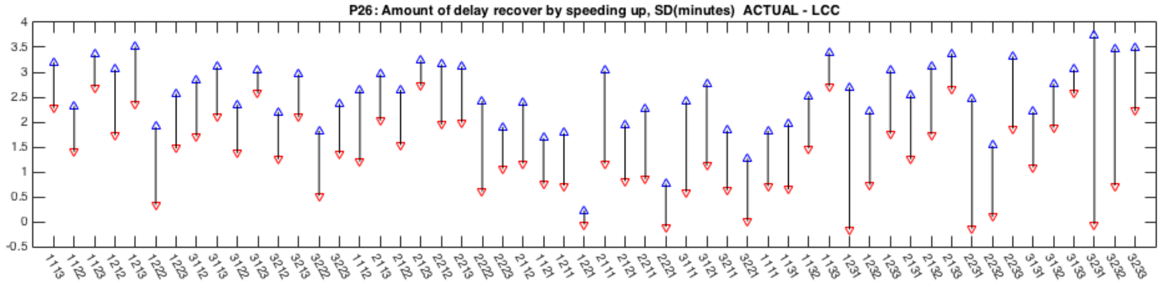

P26: Amount of delay recover by speeding up, SD(minutes) ACTUAL - ALL


P26: Amount of delay recover by speeding up, SD(minutes) ACTUAL - CHT

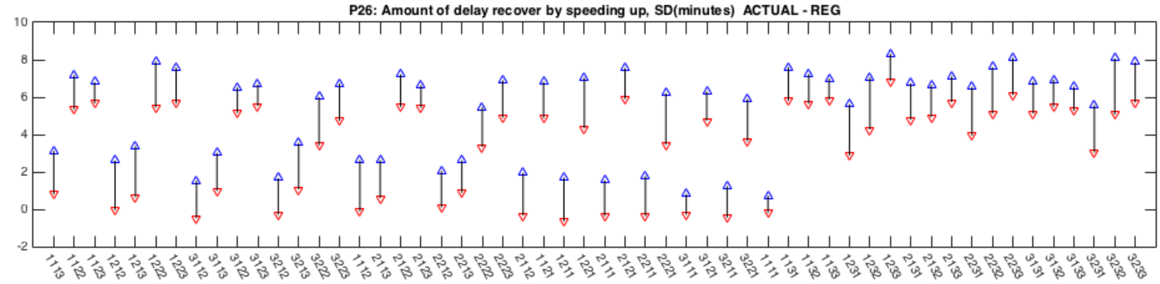
P26: Amount of delay recover by speeding up, SD(minutes) ACTUAL - FSC



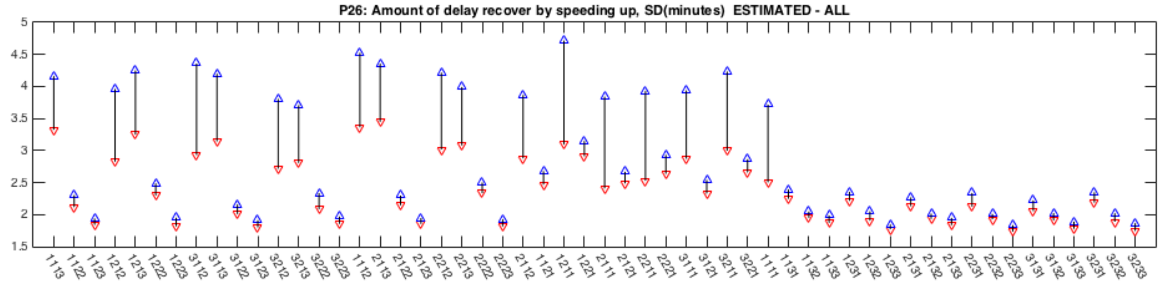
P26: Amount of delay recover by speeding up, SD(minutes) ACTUAL - LCC



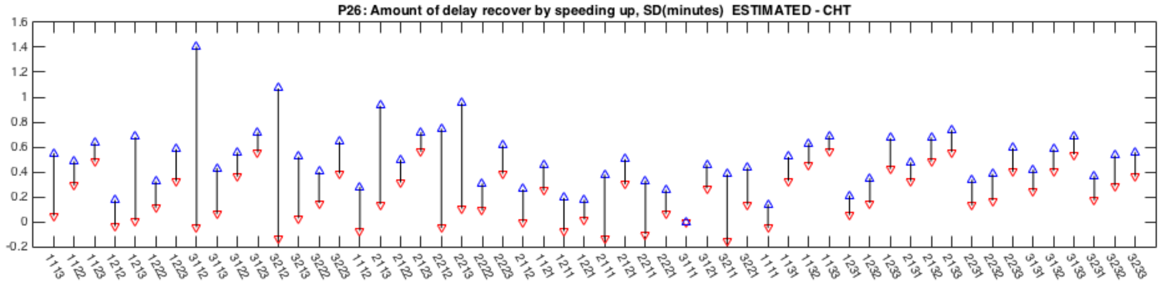
P26: Amount of delay recover by speeding up, SD(minutes) ACTUAL - REG

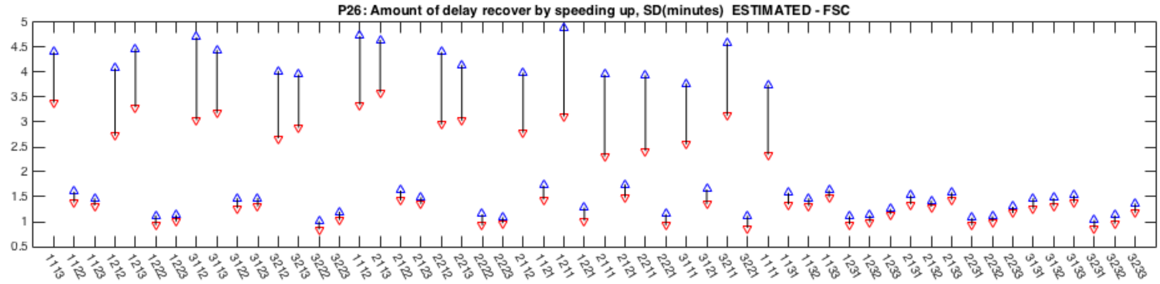


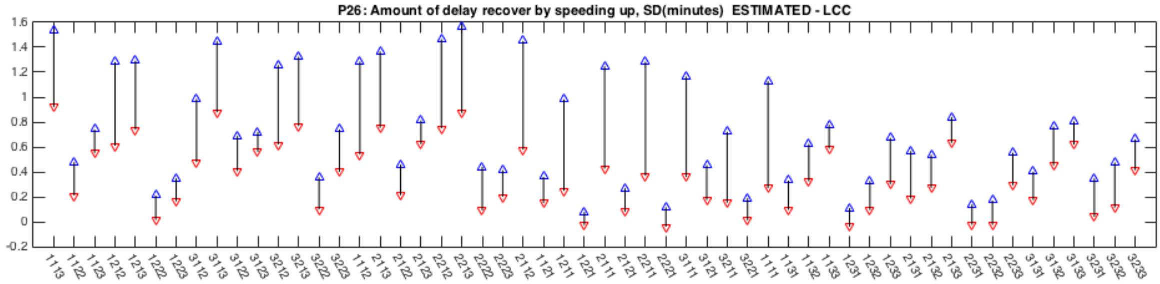
P26: Amount of delay recover by speeding up, SD(minutes) ESTIMATED - ALL

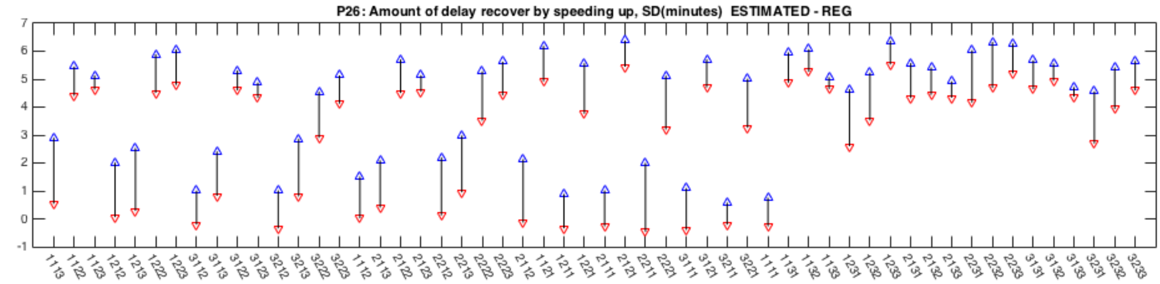


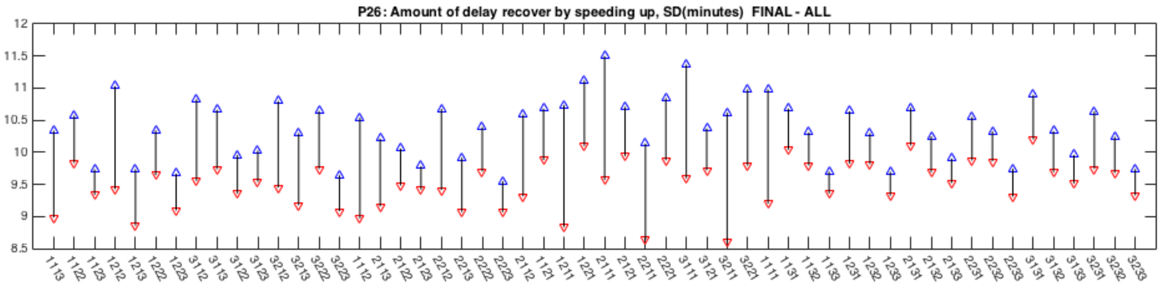
P26: Amount of delay recover by speeding up, SD(minutes) ESTIMATED - CHT

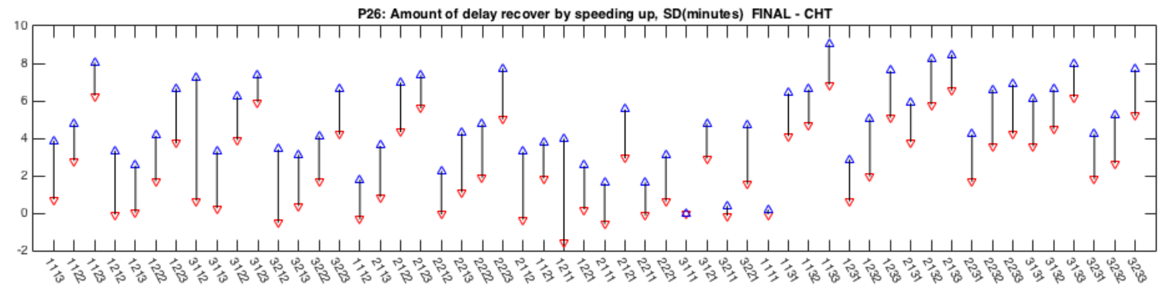


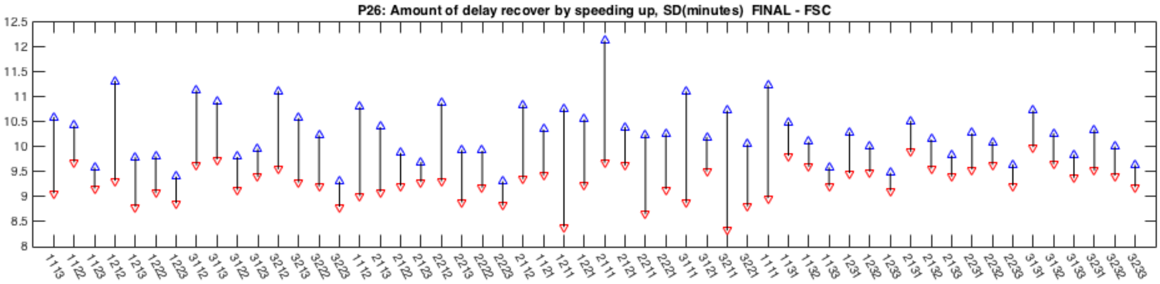

P26: Amount of delay recover by speeding up, SD(minutes) ESTIMATED - FSC

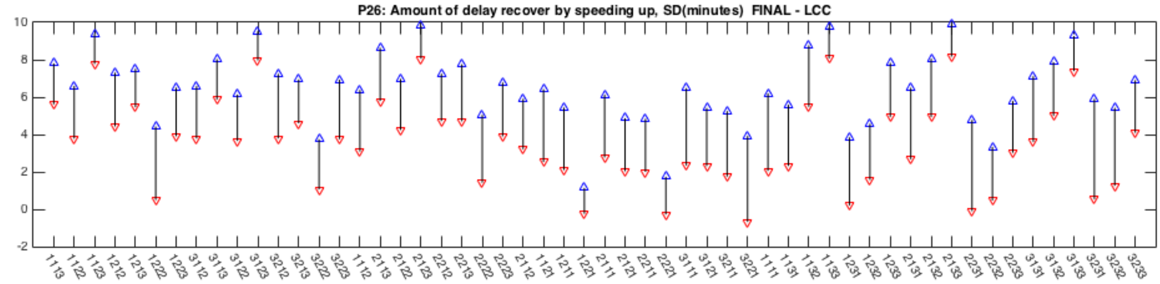

P26: Amount of delay recover by speeding up, SD(minutes) ESTIMATED - LCC

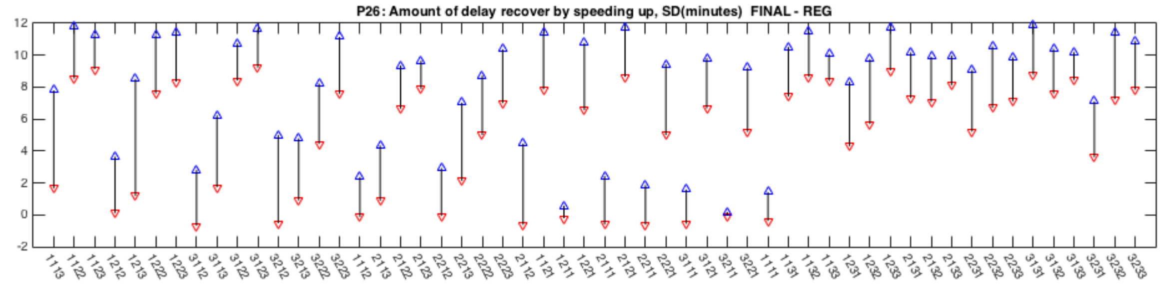

P26: Amount of delay recover by speeding up, SD(minutes) ESTIMATED - REG


P26: Amount of delay recover by speeding up, SD(minutes) FINAL - ALL


P26: Amount of delay recover by speeding up, SD(minutes) FINAL - CHT


P26: Amount of delay recover by speeding up, SD(minutes) FINAL - FSC


P26: Amount of delay recover by speeding up, SD(minutes) FINAL - LCC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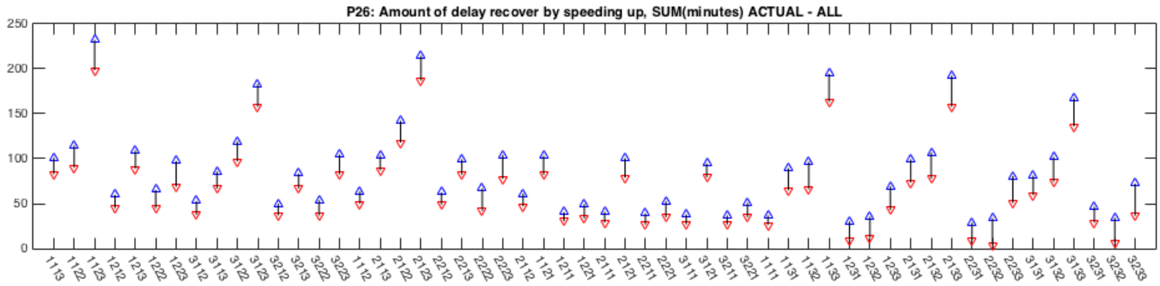
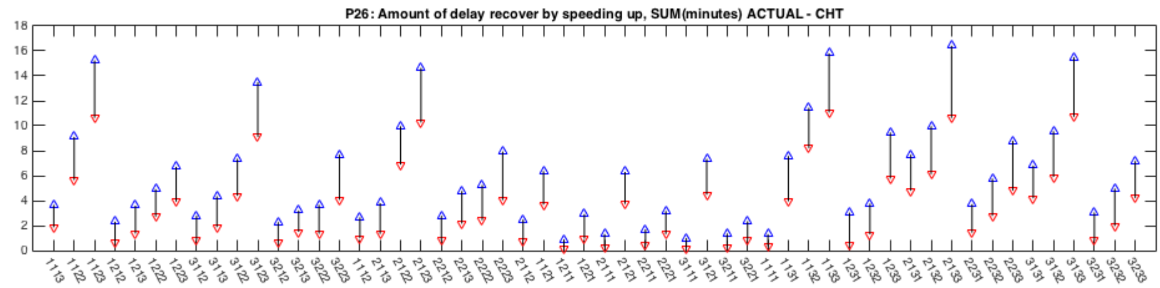
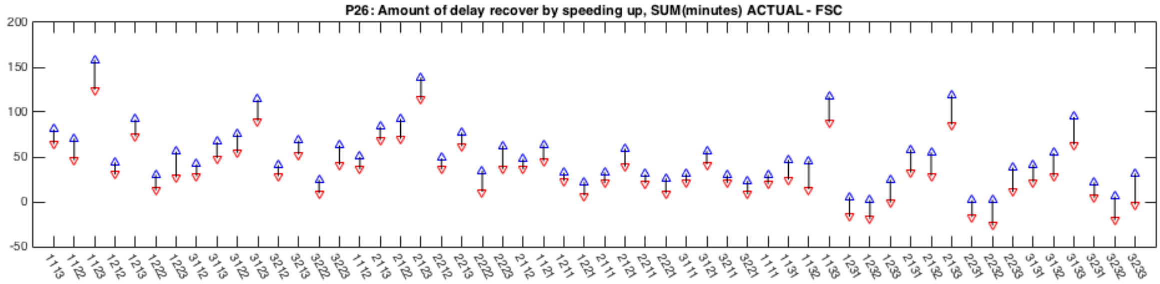
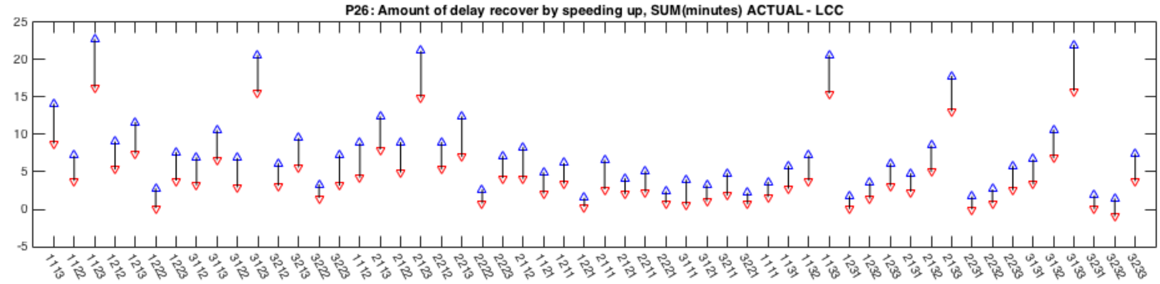
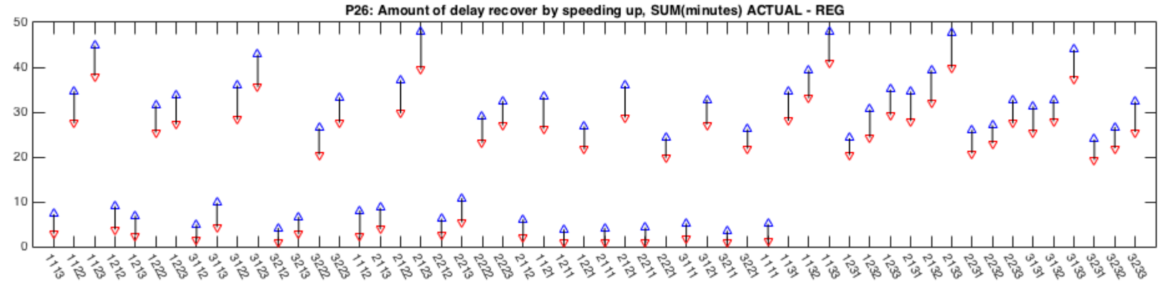
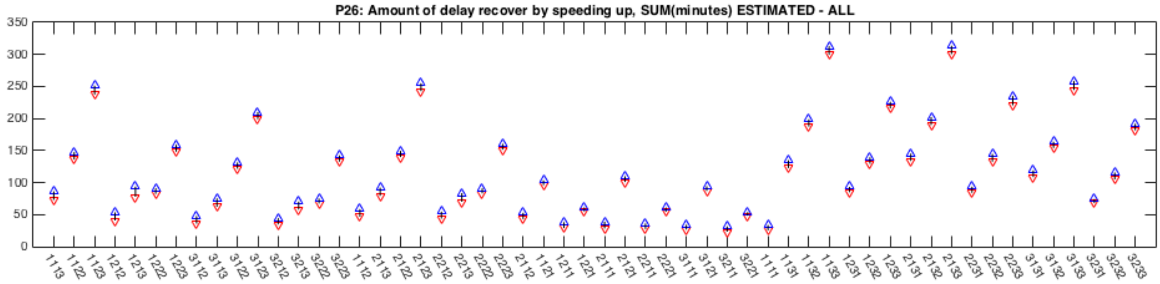

P26: Amount of delay recover by speeding up, SUM(minutes) ACTUAL - ALL

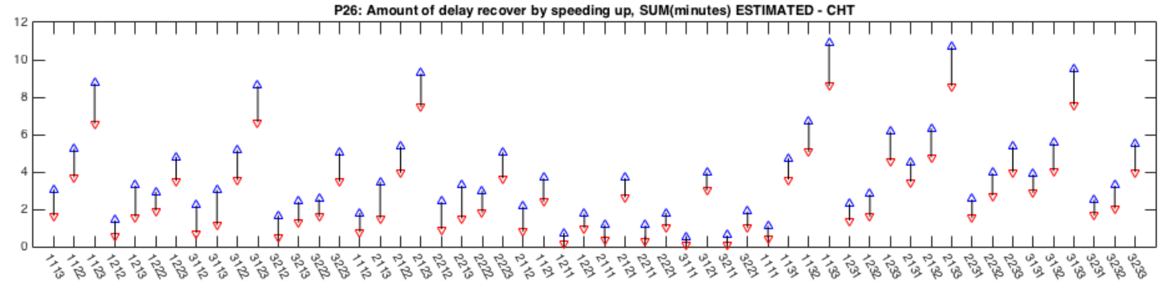

P26: Amount of delay recover by speeding up, SUM(minutes) ACTUAL - CHT

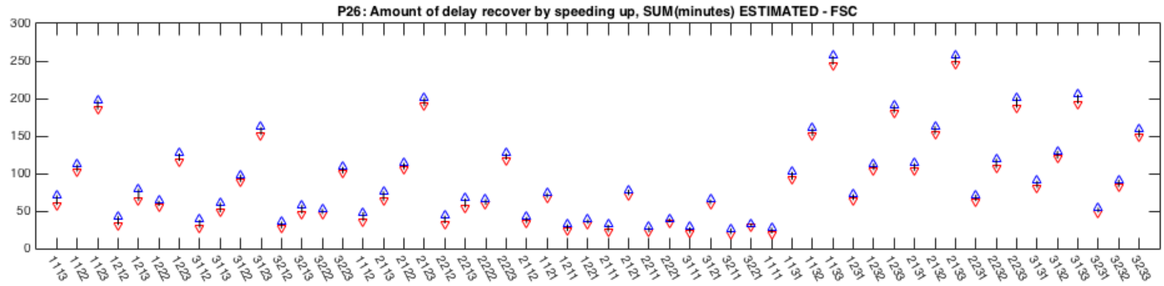

P26: Amount of delay recover by speeding up, SUM(minutes) ACTUAL - FSC

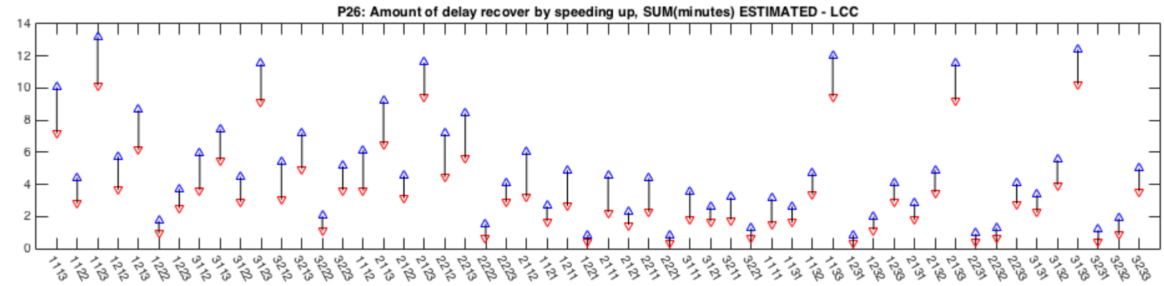

P26: Amount of delay recover by speeding up, SUM(minutes) ACTUAL - LCC

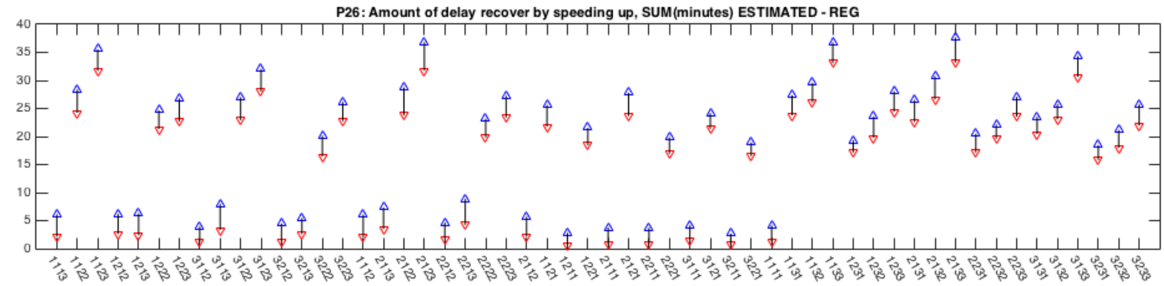

P26: Amount of delay recover by speeding up, SUM(minutes) ACTUAL - REG


P26: Amount of delay recover by speeding up, SUM(minutes) ESTIMATED - ALL


P26: Amount of delay recover by speeding up, SUM(minutes) ESTIMATED - CHT


P26: Amount of delay recover by speeding up, SUM(minutes) ESTIMATED - FSC


P26: Amount of delay recover by speeding up, SUM(minutes) ESTIMATED - LCC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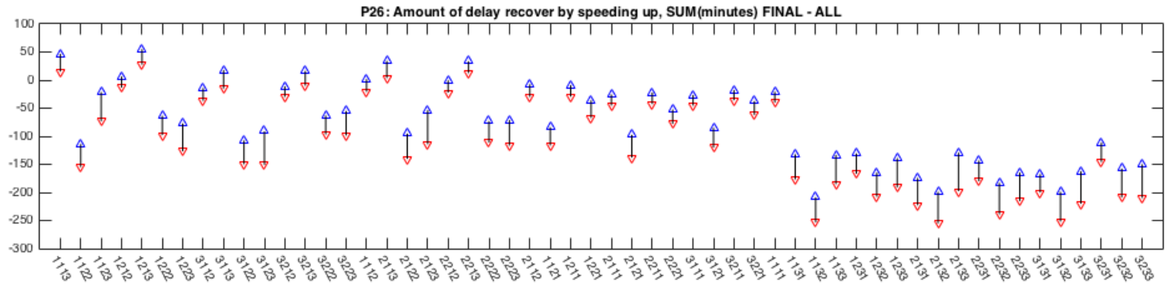
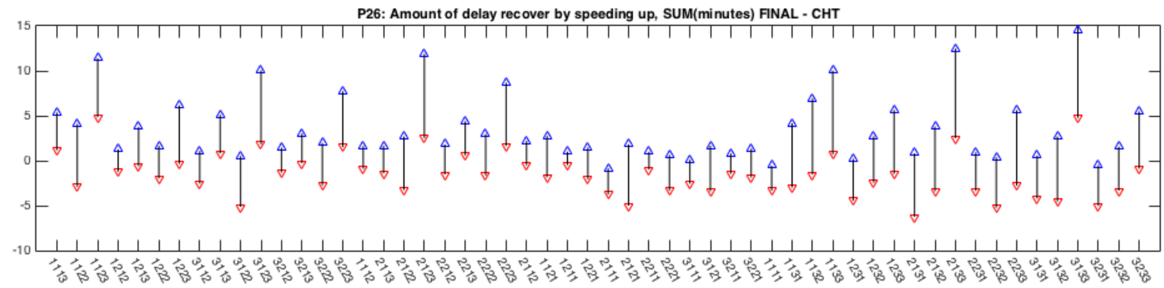
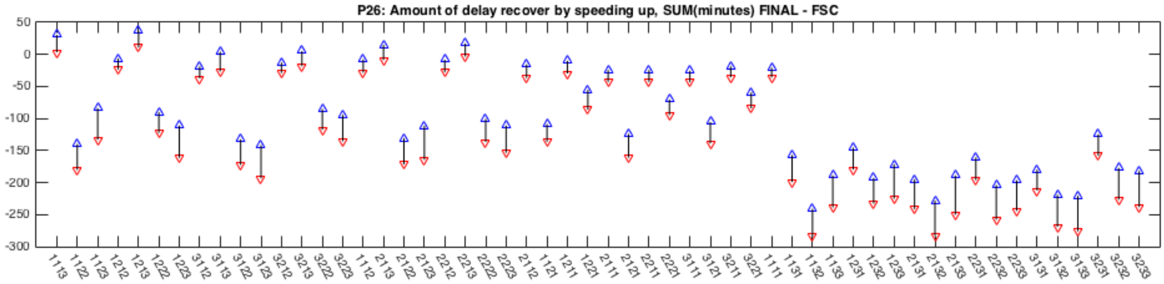
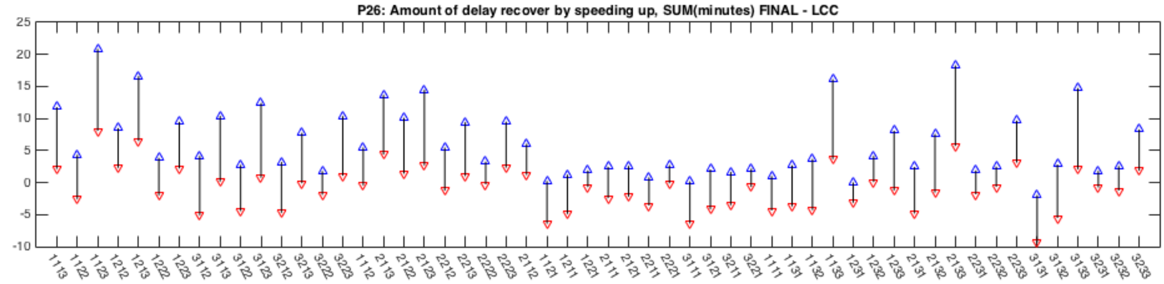
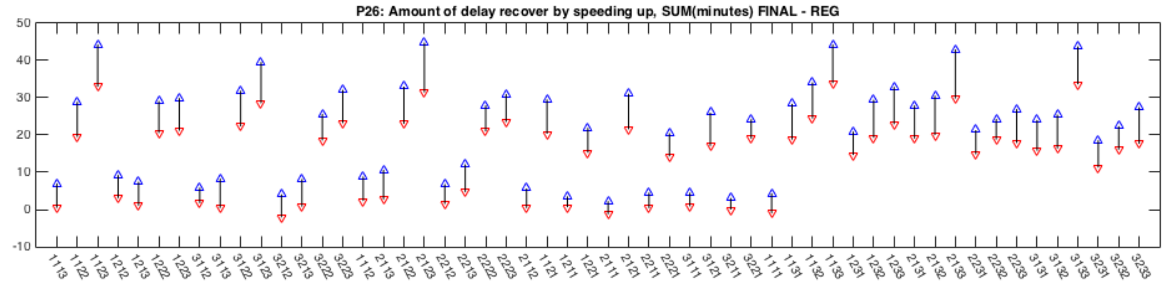
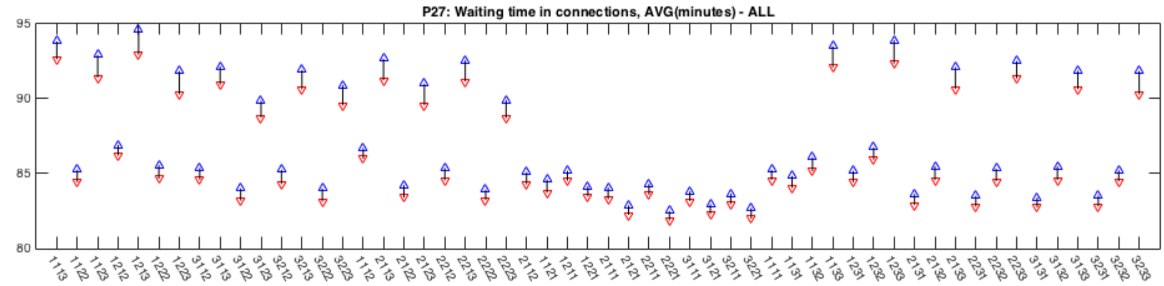

P26: Amount of delay recover by speeding up, SUM(minutes) FINAL - ALL

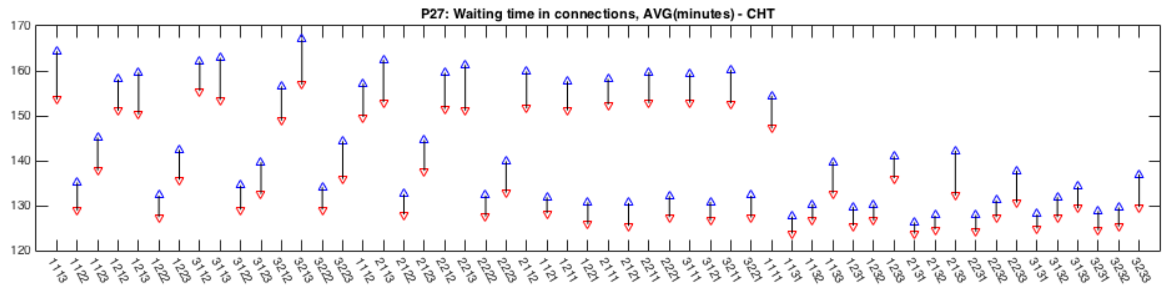

P26: Amount of delay recover by speeding up, SUM(minutes) FINAL - CHT

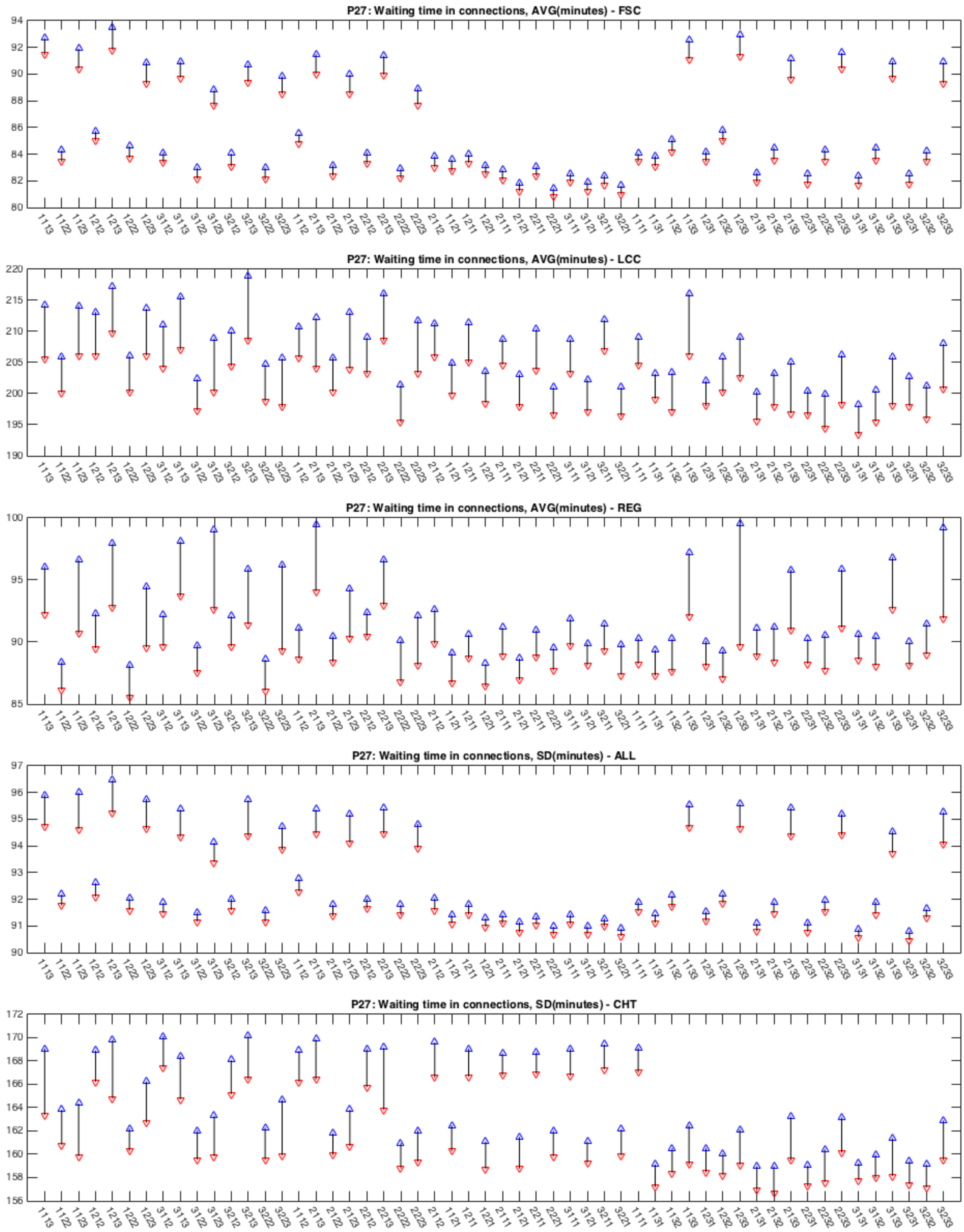

P26: Amount of delay recover by speeding up, SUM(minutes) FINAL - FSC

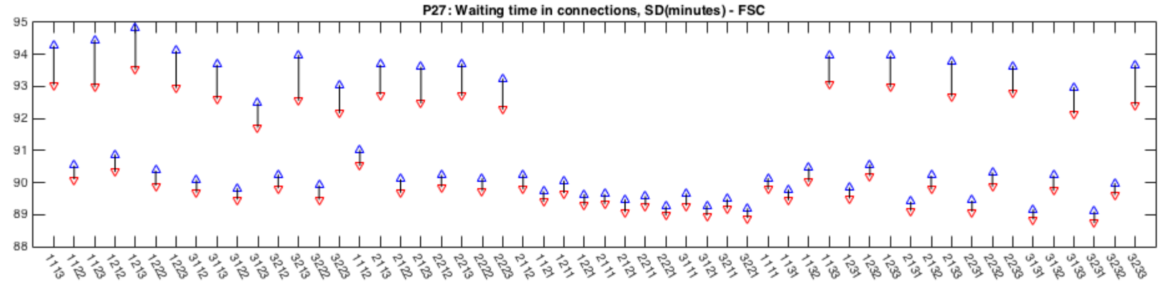

P26: Amount of delay recover by speeding up, SUM(minutes) FINAL - LCC

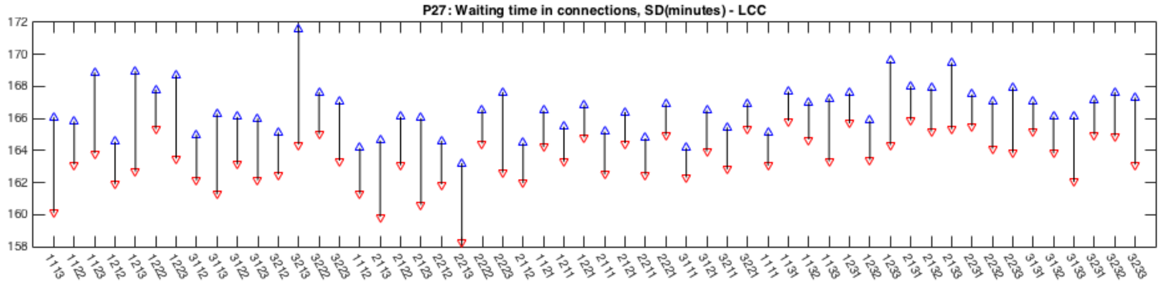

P26: Amount of delay recover by speeding up, SUM(minutes) FINAL - REG

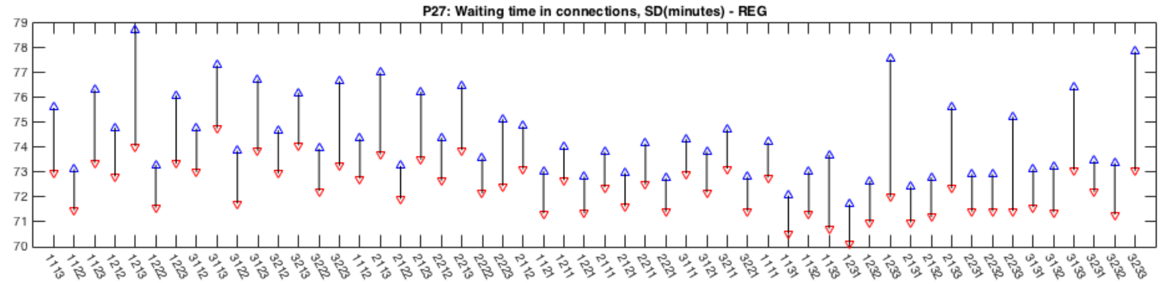

P27: Waiting time in connections, AVG(minutes) - ALL

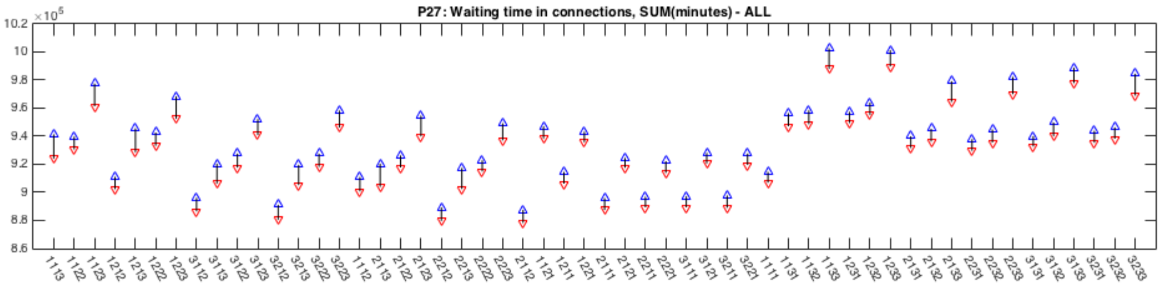

P27: Waiting time in connections, AVG(minutes) - CHT

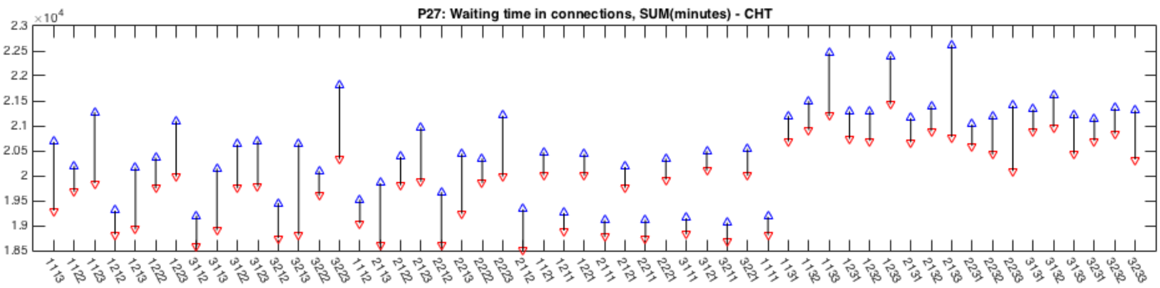

P27: Waiting time in connections, AVG(minutes) - FSC
P27: Waiting time in connections, AVG(minutes) - LCC
P27: Waiting time in connections, AVG(minutes) - REG
P27: Waiting time in connections, SD(minutes) - ALL
P27: Waiting time in connections, SD(minutes) - CHT

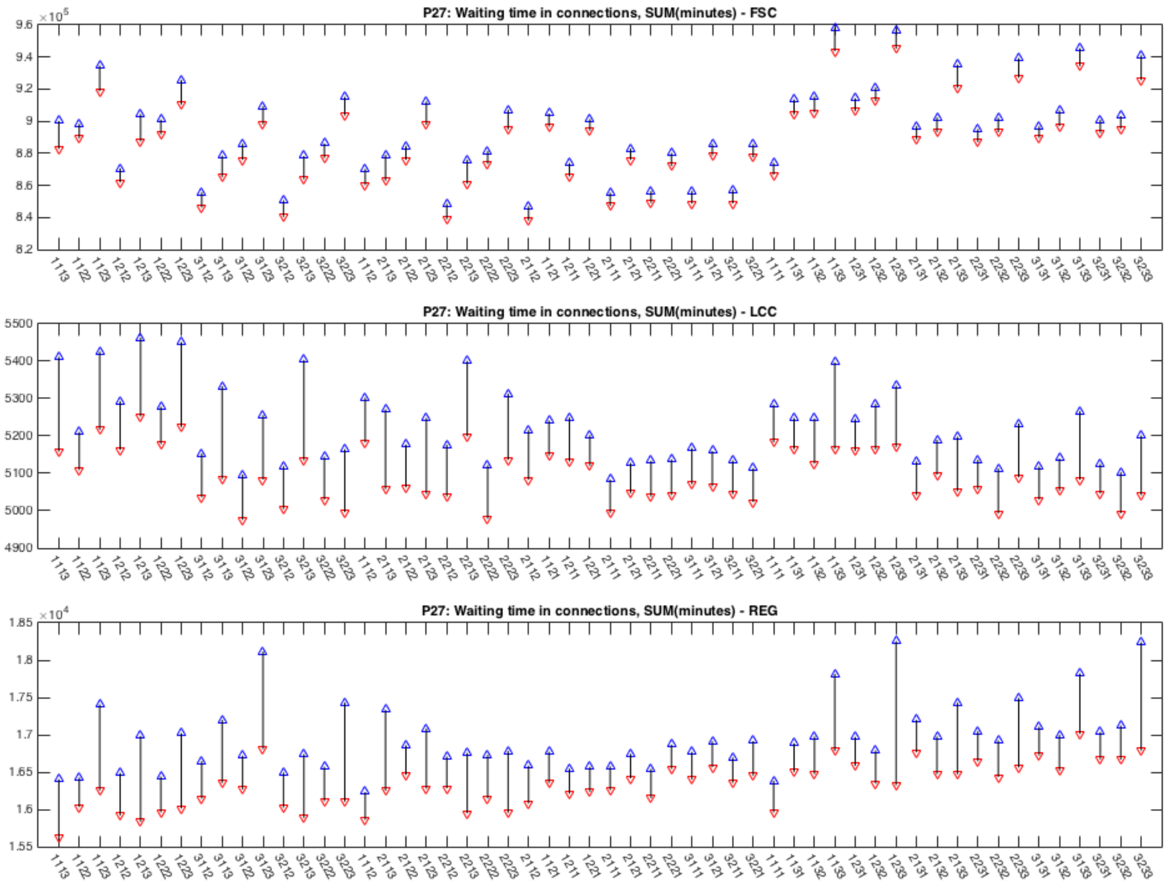

P27: Waiting time in connections, SD(minutes) - FSC


P27: Waiting time in connections, SD(minutes) - LCC


P27: Waiting time in connections, SD(minutes) - REG


P27: Waiting time in connections, SUM(minutes) - ALL


P27: Waiting time in connections, SUM(minutes) - CHT


P27: Waiting time in connections, SUM(minutes) - FSC
P27: Waiting time in connections, SUM(minutes) - LCC
P27: Waiting time in connections, SUM(minutes) - REG

# Appendix E Kolmogorov – Smirnov test

When studying the outputs of several simulations it is important to determine to what extend are the scenarios statistically different, e.g. are the metrics values extracted from the same distribution?

The two samples KS-test assumes the Null hypothesis:

- $H_0$: The two samples come from the same probability distribution

The Null hypothesis is rejected when the p-value is < 0.05 (i.e. with a 95% significance level. In this case the two samples (scenario outputs) can be safely considered different. On the contrary if the null hypothesis is not rejected (i.e. p-value >0.05) it is likely that the two samples are indeed coming from the same distribution, the higher the p-value the most likely this situation could be.

This is a fundamental piece of work previous to the analysis of results, since any conclusions based on statistically identical metrics would most likely due to the uncertainty of the system itself, i.e. noise.

The complete table of KS-tests contains 54x54x381, which is more than 1 million entries, too much for a word document. Instead, the following table summarizes the findings of the KS-tests, for each pair of scenarios the number of statistically differentiable metrics is shown on the third column, the closer to 381 the more different the scenarios are. The last column shows a score consisting on the addition of all p-values, a score near to 0 means that the two scenarios are completely different, the higher the score the more statistically the two scenarios are.

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1122** | 1113 | 194 | 9.37 |
| **1123** | 1113 | 152 | 39.05 |
| **1123** | 1122 | 152 | 32.98 |
| **1212** | 1113 | 143 | 41.29 |
| **1212** | 1122 | 170 | 23.02 |
| **1212** | 1123 | 202 | 8.93 |
| **1213** | 1113 | 33 | 106.04 |
| **1213** | 1122 | 197 | 12.17 |
| **1213** | 1123 | 164 | 21.13 |
| **1213** | 1212 | 134 | 48.36 |
| **1222** | 1113 | 186 | 15.16 |
| **1222** | 1122 | 78 | 77.29 |
| **1222** | 1123 | 176 | 18.42 |
| **1222** | 1212 | 159 | 24.62 |
| **1222** | 1213 | 186 | 17.84 |
| **1223** | 1113 | 155 | 31.69 |
| **1223** | 1122 | 140 | 39.51 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1223** | 1123 | 86 | 63.60 |
| **1223** | 1212 | 195 | 11.16 |
| **1223** | 1213 | 166 | 20.50 |
| **1223** | 1222 | 145 | 34.99 |
| **3112** | 1113 | 165 | 31.16 |
| **3112** | 1122 | 184 | 16.23 |
| **3112** | 1123 | 212 | 4.14 |
| **3112** | 1212 | 81 | 87.27 |
| **3112** | 1213 | 165 | 28.56 |
| **3112** | 1222 | 172 | 20.80 |
| **3112** | 1223 | 214 | 4.67 |
| **3113** | 1113 | 70 | 78.65 |
| **3113** | 1122 | 206 | 8.09 |
| **3113** | 1123 | 173 | 27.15 |
| **3113** | 1212 | 140 | 35.42 |
| **3113** | 1213 | 95 | 63.89 |
| **3113** | 1222 | 199 | 12.93 |
| **3113** | 1223 | 169 | 25.16 |
| **3113** | 3112 | 122 | 49.23 |
| **3122** | 1113 | 210 | 4.82 |
| **3122** | 1122 | 96 | 64.42 |
| **3122** | 1123 | 184 | 15.68 |
| **3122** | 1212 | 173 | 14.89 |
| **3122** | 1213 | 205 | 6.60 |
| **3122** | 1222 | 124 | 49.24 |
| **3122** | 1223 | 175 | 21.28 |
| **3122** | 3112 | 170 | 25.50 |
| **3122** | 3113 | 198 | 7.95 |
| **3123** | 1113 | 181 | 15.74 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3123** | 1122 | 176 | 20.38 |
| **3123** | 1123 | 132 | 47.24 |
| **3123** | 1212 | 206 | 7.75 |
| **3123** | 1213 | 184 | 18.17 |
| **3123** | 1222 | 194 | 13.88 |
| **3123** | 1223 | 131 | 35.25 |
| **3123** | 3112 | 201 | 11.52 |
| **3123** | 3113 | 162 | 27.08 |
| **3123** | 3122 | 144 | 31.04 |
| **3212** | 1113 | 169 | 27.56 |
| **3212** | 1122 | 177 | 23.15 |
| **3212** | 1123 | 209 | 6.75 |
| **3212** | 1212 | 72 | 101.64 |
| **3212** | 1213 | 164 | 30.16 |
| **3212** | 1222 | 169 | 22.11 |
| **3212** | 1223 | 206 | 7.36 |
| **3212** | 3112 | 32 | 120.50 |
| **3212** | 3113 | 135 | 47.67 |
| **3212** | 3122 | 170 | 26.75 |
| **3212** | 3123 | 202 | 8.75 |
| **3213** | 1113 | 76 | 87.67 |
| **3213** | 1122 | 198 | 7.83 |
| **3213** | 1123 | 173 | 26.82 |
| **3213** | 1212 | 149 | 34.61 |
| **3213** | 1213 | 81 | 80.41 |
| **3213** | 1222 | 194 | 14.86 |
| **3213** | 1223 | 167 | 25.82 |
| **3213** | 3112 | 139 | 40.57 |
| **3213** | 3113 | 28 | 124.75 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3213** | 3122 | 199 | 6.54 |
| **3213** | 3123 | 162 | 25.35 |
| **3213** | 3212 | 126 | 50.98 |
| **3222** | 1113 | 196 | 10.69 |
| **3222** | 1122 | 126 | 42.61 |
| **3222** | 1123 | 197 | 9.29 |
| **3222** | 1212 | 172 | 23.36 |
| **3222** | 1213 | 197 | 13.84 |
| **3222** | 1222 | 91 | 66.19 |
| **3222** | 1223 | 186 | 11.35 |
| **3222** | 3112 | 161 | 30.34 |
| **3222** | 3113 | 189 | 15.76 |
| **3222** | 3122 | 73 | 83.73 |
| **3222** | 3123 | 175 | 18.21 |
| **3222** | 3212 | 149 | 29.51 |
| **3222** | 3213 | 187 | 15.71 |
| **3223** | 1113 | 170 | 26.28 |
| **3223** | 1122 | 164 | 36.73 |
| **3223** | 1123 | 115 | 58.27 |
| **3223** | 1212 | 207 | 8.37 |
| **3223** | 1213 | 175 | 21.79 |
| **3223** | 1222 | 181 | 19.43 |
| **3223** | 1223 | 96 | 70.49 |
| **3223** | 3112 | 205 | 8.67 |
| **3223** | 3113 | 156 | 33.61 |
| **3223** | 3122 | 144 | 37.25 |
| **3223** | 3123 | 101 | 55.36 |
| **3223** | 3212 | 201 | 13.69 |
| **3223** | 3213 | 153 | 27.23 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3223** | 3222 | 151 | 33.88 |
| **1112** | 1113 | 126 | 47.42 |
| **1112** | 1122 | 176 | 19.94 |
| **1112** | 1123 | 199 | 11.88 |
| **1112** | 1212 | 32 | 121.68 |
| **1112** | 1213 | 137 | 46.06 |
| **1112** | 1222 | 173 | 22.35 |
| **1112** | 1223 | 198 | 10.28 |
| **1112** | 3112 | 88 | 72.66 |
| **1112** | 3113 | 141 | 41.40 |
| **1112** | 3122 | 189 | 14.95 |
| **1112** | 3123 | 205 | 7.36 |
| **1112** | 3212 | 83 | 67.75 |
| **1112** | 3213 | 150 | 35.37 |
| **1112** | 3222 | 176 | 20.95 |
| **1112** | 3223 | 210 | 8.86 |
| **2113** | 1113 | 21 | 128.63 |
| **2113** | 1122 | 190 | 11.67 |
| **2113** | 1123 | 153 | 40.91 |
| **2113** | 1212 | 135 | 43.75 |
| **2113** | 1213 | 55 | 94.18 |
| **2113** | 1222 | 186 | 18.19 |
| **2113** | 1223 | 153 | 29.06 |
| **2113** | 3112 | 158 | 31.40 |
| **2113** | 3113 | 81 | 84.68 |
| **2113** | 3122 | 207 | 5.74 |
| **2113** | 3123 | 190 | 14.54 |
| **2113** | 3212 | 165 | 32.06 |
| **2113** | 3213 | 76 | 86.96 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2113** | 3222 | 194 | 13.32 |
| **2113** | 3223 | 166 | 24.48 |
| **2113** | 1112 | 118 | 54.78 |
| **2122** | 1113 | 205 | 8.00 |
| **2122** | 1122 | 42 | 100.79 |
| **2122** | 1123 | 150 | 32.00 |
| **2122** | 1212 | 173 | 21.95 |
| **2122** | 1213 | 194 | 10.08 |
| **2122** | 1222 | 99 | 58.32 |
| **2122** | 1223 | 147 | 36.97 |
| **2122** | 3112 | 194 | 16.34 |
| **2122** | 3113 | 208 | 6.58 |
| **2122** | 3122 | 94 | 70.43 |
| **2122** | 3123 | 179 | 17.17 |
| **2122** | 3212 | 186 | 21.20 |
| **2122** | 3213 | 202 | 6.43 |
| **2122** | 3222 | 119 | 44.39 |
| **2122** | 3223 | 161 | 30.66 |
| **2122** | 1112 | 176 | 18.16 |
| **2122** | 2113 | 196 | 9.34 |
| **2123** | 1113 | 148 | 28.86 |
| **2123** | 1122 | 149 | 35.59 |
| **2123** | 1123 | 28 | 98.95 |
| **2123** | 1212 | 198 | 12.06 |
| **2123** | 1213 | 170 | 22.96 |
| **2123** | 1222 | 173 | 23.11 |
| **2123** | 1223 | 84 | 74.51 |
| **2123** | 3112 | 207 | 4.47 |
| **2123** | 3113 | 174 | 20.09 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2123** | 3122 | 180 | 15.70 |
| **2123** | 3123 | 97 | 52.77 |
| **2123** | 3212 | 208 | 7.71 |
| **2123** | 3213 | 169 | 25.43 |
| **2123** | 3222 | 191 | 14.95 |
| **2123** | 3223 | 120 | 55.96 |
| **2123** | 1112 | 192 | 13.64 |
| **2123** | 2113 | 154 | 31.29 |
| **2123** | 2122 | 141 | 37.06 |
| **2212** | 1113 | 128 | 49.83 |
| **2212** | 1122 | 175 | 21.86 |
| **2212** | 1123 | 203 | 7.39 |
| **2212** | 1212 | 18 | 129.55 |
| **2212** | 1213 | 122 | 56.31 |
| **2212** | 1222 | 166 | 23.34 |
| **2212** | 1223 | 196 | 13.39 |
| **2212** | 3112 | 71 | 75.07 |
| **2212** | 3113 | 149 | 40.12 |
| **2212** | 3122 | 183 | 12.44 |
| **2212** | 3123 | 207 | 7.38 |
| **2212** | 3212 | 69 | 93.87 |
| **2212** | 3213 | 139 | 42.15 |
| **2212** | 3222 | 171 | 21.13 |
| **2212** | 3223 | 211 | 6.06 |
| **2212** | 1112 | 49 | 102.52 |
| **2212** | 2113 | 129 | 55.47 |
| **2212** | 2122 | 178 | 16.41 |
| **2212** | 2123 | 196 | 11.16 |
| **2213** | 1113 | 43 | 106.52 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2213** | 1122 | 198 | 9.28 |
| **2213** | 1123 | 157 | 31.68 |
| **2213** | 1212 | 115 | 50.19 |
| **2213** | 1213 | 31 | 96.54 |
| **2213** | 1222 | 188 | 18.18 |
| **2213** | 1223 | 150 | 36.03 |
| **2213** | 3112 | 162 | 28.37 |
| **2213** | 3113 | 71 | 85.30 |
| **2213** | 3122 | 206 | 5.14 |
| **2213** | 3123 | 183 | 19.44 |
| **2213** | 3212 | 156 | 29.02 |
| **2213** | 3213 | 64 | 96.74 |
| **2213** | 3222 | 195 | 11.94 |
| **2213** | 3223 | 171 | 17.52 |
| **2213** | 1112 | 131 | 46.66 |
| **2213** | 2113 | 26 | 114.97 |
| **2213** | 2122 | 202 | 7.58 |
| **2213** | 2123 | 158 | 30.25 |
| **2213** | 2212 | 109 | 56.86 |
| **2222** | 1113 | 188 | 15.94 |
| **2222** | 1122 | 95 | 62.66 |
| **2222** | 1123 | 182 | 20.50 |
| **2222** | 1212 | 161 | 24.38 |
| **2222** | 1213 | 187 | 16.45 |
| **2222** | 1222 | 23 | 127.49 |
| **2222** | 1223 | 148 | 30.42 |
| **2222** | 3112 | 174 | 25.49 |
| **2222** | 3113 | 194 | 11.14 |
| **2222** | 3122 | 121 | 46.86 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2222** | 3123 | 198 | 9.86 |
| **2222** | 3212 | 176 | 23.81 |
| **2222** | 3213 | 196 | 12.41 |
| **2222** | 3222 | 97 | 57.93 |
| **2222** | 3223 | 184 | 17.42 |
| **2222** | 1112 | 179 | 19.12 |
| **2222** | 2113 | 188 | 15.38 |
| **2222** | 2122 | 75 | 84.24 |
| **2222** | 2123 | 174 | 24.10 |
| **2222** | 2212 | 163 | 23.50 |
| **2222** | 2213 | 187 | 15.71 |
| **2223** | 1113 | 166 | 26.26 |
| **2223** | 1122 | 143 | 44.73 |
| **2223** | 1123 | 109 | 55.82 |
| **2223** | 1212 | 196 | 10.14 |
| **2223** | 1213 | 168 | 21.72 |
| **2223** | 1222 | 151 | 28.84 |
| **2223** | 1223 | 27 | 116.70 |
| **2223** | 3112 | 210 | 6.41 |
| **2223** | 3113 | 171 | 24.54 |
| **2223** | 3122 | 176 | 19.60 |
| **2223** | 3123 | 133 | 37.15 |
| **2223** | 3212 | 208 | 8.27 |
| **2223** | 3213 | 170 | 24.18 |
| **2223** | 3222 | 190 | 12.07 |
| **2223** | 3223 | 96 | 56.57 |
| **2223** | 1112 | 195 | 13.47 |
| **2223** | 2113 | 165 | 27.51 |
| **2223** | 2122 | 142 | 41.18 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2223** | 2123 | 78 | 75.39 |
| **2223** | 2212 | 196 | 10.16 |
| **2223** | 2213 | 157 | 29.17 |
| **2223** | 2222 | 156 | 25.84 |
| **2112** | 1113 | 130 | 48.46 |
| **2112** | 1122 | 170 | 26.56 |
| **2112** | 1123 | 204 | 10.67 |
| **2112** | 1212 | 49 | 106.38 |
| **2112** | 1213 | 134 | 45.05 |
| **2112** | 1222 | 167 | 24.57 |
| **2112** | 1223 | 207 | 11.21 |
| **2112** | 3112 | 72 | 90.10 |
| **2112** | 3113 | 150 | 38.44 |
| **2112** | 3122 | 182 | 21.52 |
| **2112** | 3123 | 203 | 8.17 |
| **2112** | 3212 | 71 | 101.03 |
| **2112** | 3213 | 156 | 37.60 |
| **2112** | 3222 | 171 | 20.13 |
| **2112** | 3223 | 208 | 8.36 |
| **2112** | 1112 | 32 | 110.56 |
| **2112** | 2113 | 128 | 55.33 |
| **2112** | 2122 | 172 | 26.40 |
| **2112** | 2123 | 195 | 12.48 |
| **2112** | 2212 | 30 | 125.39 |
| **2112** | 2213 | 136 | 48.32 |
| **2112** | 2222 | 166 | 27.31 |
| **2112** | 2223 | 200 | 12.71 |
| **1121** | 1113 | 194 | 10.27 |
| **1121** | 1122 | 104 | 55.55 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1121** | 1123 | 164 | 20.36 |
| **1121** | 1212 | 185 | 17.63 |
| **1121** | 1213 | 195 | 11.70 |
| **1121** | 1222 | 117 | 47.39 |
| **1121** | 1223 | 155 | 30.92 |
| **1121** | 3112 | 191 | 15.24 |
| **1121** | 3113 | 206 | 8.69 |
| **1121** | 3122 | 164 | 25.47 |
| **1121** | 3123 | 185 | 13.83 |
| **1121** | 3212 | 193 | 14.47 |
| **1121** | 3213 | 202 | 8.56 |
| **1121** | 3222 | 145 | 34.80 |
| **1121** | 3223 | 165 | 25.29 |
| **1121** | 1112 | 183 | 19.09 |
| **1121** | 2113 | 192 | 12.07 |
| **1121** | 2122 | 122 | 51.83 |
| **1121** | 2123 | 164 | 24.56 |
| **1121** | 2212 | 185 | 15.56 |
| **1121** | 2213 | 191 | 11.86 |
| **1121** | 2222 | 127 | 45.31 |
| **1121** | 2223 | 156 | 28.40 |
| **1121** | 2112 | 185 | 19.29 |
| **1211** | 1113 | 153 | 36.11 |
| **1211** | 1122 | 192 | 12.89 |
| **1211** | 1123 | 204 | 8.20 |
| **1211** | 1212 | 85 | 75.07 |
| **1211** | 1213 | 143 | 37.39 |
| **1211** | 1222 | 183 | 17.66 |
| **1211** | 1223 | 203 | 8.94 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1211** | 3112 | 124 | 51.67 |
| **1211** | 3113 | 167 | 26.82 |
| **1211** | 3122 | 202 | 10.24 |
| **1211** | 3123 | 209 | 8.35 |
| **1211** | 3212 | 125 | 55.87 |
| **1211** | 3213 | 163 | 28.97 |
| **1211** | 3222 | 192 | 15.43 |
| **1211** | 3223 | 208 | 8.56 |
| **1211** | 1112 | 110 | 54.84 |
| **1211** | 2113 | 146 | 32.82 |
| **1211** | 2122 | 183 | 17.49 |
| **1211** | 2123 | 202 | 9.95 |
| **1211** | 2212 | 90 | 71.04 |
| **1211** | 2213 | 138 | 33.44 |
| **1211** | 2222 | 174 | 20.80 |
| **1211** | 2223 | 201 | 10.77 |
| **1211** | 2112 | 110 | 58.42 |
| **1211** | 1121 | 180 | 21.13 |
| **1221** | 1113 | 191 | 17.48 |
| **1221** | 1122 | 163 | 23.38 |
| **1221** | 1123 | 193 | 9.83 |
| **1221** | 1212 | 168 | 27.68 |
| **1221** | 1213 | 187 | 21.05 |
| **1221** | 1222 | 114 | 50.53 |
| **1221** | 1223 | 172 | 18.70 |
| **1221** | 3112 | 177 | 21.99 |
| **1221** | 3113 | 188 | 16.68 |
| **1221** | 3122 | 183 | 16.84 |
| **1221** | 3123 | 194 | 6.19 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1221** | 3212 | 185 | 19.96 |
| **1221** | 3213 | 192 | 15.84 |
| **1221** | 3222 | 150 | 35.67 |
| **1221** | 3223 | 194 | 9.49 |
| **1221** | 1112 | 176 | 23.83 |
| **1221** | 2113 | 186 | 18.54 |
| **1221** | 2122 | 163 | 23.36 |
| **1221** | 2123 | 188 | 12.57 |
| **1221** | 2212 | 166 | 27.96 |
| **1221** | 2213 | 191 | 16.99 |
| **1221** | 2222 | 110 | 54.01 |
| **1221** | 2223 | 170 | 17.26 |
| **1221** | 2112 | 173 | 23.49 |
| **1221** | 1121 | 75 | 79.49 |
| **1221** | 1211 | 166 | 28.93 |
| **2111** | 1113 | 146 | 36.63 |
| **2111** | 1122 | 189 | 15.66 |
| **2111** | 1123 | 206 | 6.42 |
| **2111** | 1212 | 114 | 64.94 |
| **2111** | 1213 | 151 | 39.41 |
| **2111** | 1222 | 191 | 14.93 |
| **2111** | 1223 | 205 | 9.39 |
| **2111** | 3112 | 127 | 55.78 |
| **2111** | 3113 | 156 | 30.07 |
| **2111** | 3122 | 200 | 12.60 |
| **2111** | 3123 | 206 | 6.92 |
| **2111** | 3212 | 134 | 50.40 |
| **2111** | 3213 | 168 | 28.20 |
| **2111** | 3222 | 193 | 16.08 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2111** | 3223 | 206 | 8.07 |
| **2111** | 1112 | 112 | 59.40 |
| **2111** | 2113 | 140 | 40.64 |
| **2111** | 2122 | 189 | 17.42 |
| **2111** | 2123 | 196 | 9.84 |
| **2111** | 2212 | 114 | 59.07 |
| **2111** | 2213 | 150 | 33.23 |
| **2111** | 2222 | 189 | 17.90 |
| **2111** | 2223 | 203 | 9.75 |
| **2111** | 2112 | 104 | 63.52 |
| **2111** | 1121 | 175 | 24.36 |
| **2111** | 1211 | 68 | 106.72 |
| **2111** | 1221 | 165 | 25.86 |
| **2121** | 1113 | 197 | 12.05 |
| **2121** | 1122 | 106 | 55.63 |
| **2121** | 1123 | 167 | 26.89 |
| **2121** | 1212 | 194 | 13.21 |
| **2121** | 1213 | 199 | 8.83 |
| **2121** | 1222 | 138 | 36.95 |
| **2121** | 1223 | 149 | 40.45 |
| **2121** | 3112 | 199 | 13.38 |
| **2121** | 3113 | 207 | 6.35 |
| **2121** | 3122 | 150 | 35.61 |
| **2121** | 3123 | 185 | 15.19 |
| **2121** | 3212 | 200 | 10.72 |
| **2121** | 3213 | 206 | 7.45 |
| **2121** | 3222 | 148 | 31.36 |
| **2121** | 3223 | 167 | 25.61 |
| **2121** | 1112 | 193 | 16.63 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2121** | 2113 | 201 | 10.50 |
| **2121** | 2122 | 115 | 54.53 |
| **2121** | 2123 | 167 | 24.44 |
| **2121** | 2212 | 185 | 14.86 |
| **2121** | 2213 | 202 | 11.76 |
| **2121** | 2222 | 126 | 41.54 |
| **2121** | 2223 | 150 | 33.73 |
| **2121** | 2112 | 192 | 16.09 |
| **2121** | 1121 | 53 | 84.31 |
| **2121** | 1211 | 185 | 19.05 |
| **2121** | 1221 | 115 | 48.18 |
| **2121** | 2111 | 176 | 22.14 |
| **2211** | 1113 | 153 | 35.75 |
| **2211** | 1122 | 194 | 15.28 |
| **2211** | 1123 | 207 | 7.98 |
| **2211** | 1212 | 97 | 77.14 |
| **2211** | 1213 | 142 | 40.35 |
| **2211** | 1222 | 180 | 18.84 |
| **2211** | 1223 | 194 | 10.02 |
| **2211** | 3112 | 143 | 49.67 |
| **2211** | 3113 | 172 | 29.00 |
| **2211** | 3122 | 198 | 11.44 |
| **2211** | 3123 | 205 | 9.59 |
| **2211** | 3212 | 140 | 50.61 |
| **2211** | 3213 | 164 | 33.91 |
| **2211** | 3222 | 187 | 16.99 |
| **2211** | 3223 | 203 | 9.36 |
| **2211** | 1112 | 129 | 50.26 |
| **2211** | 2113 | 151 | 35.13 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2211** | 2122 | 194 | 13.68 |
| **2211** | 2123 | 205 | 9.78 |
| **2211** | 2212 | 99 | 61.59 |
| **2211** | 2213 | 145 | 37.44 |
| **2211** | 2222 | 177 | 21.37 |
| **2211** | 2223 | 202 | 10.39 |
| **2211** | 2112 | 123 | 59.75 |
| **2211** | 1121 | 176 | 19.15 |
| **2211** | 1211 | 40 | 114.52 |
| **2211** | 1221 | 165 | 31.88 |
| **2211** | 2111 | 28 | 124.55 |
| **2211** | 2121 | 182 | 21.60 |
| **2221** | 1113 | 195 | 16.73 |
| **2221** | 1122 | 161 | 24.41 |
| **2221** | 1123 | 191 | 13.15 |
| **2221** | 1212 | 179 | 22.17 |
| **2221** | 1213 | 187 | 21.45 |
| **2221** | 1222 | 110 | 54.52 |
| **2221** | 1223 | 171 | 20.70 |
| **2221** | 3112 | 189 | 21.00 |
| **2221** | 3113 | 193 | 16.36 |
| **2221** | 3122 | 180 | 22.38 |
| **2221** | 3123 | 201 | 5.78 |
| **2221** | 3212 | 188 | 18.37 |
| **2221** | 3213 | 196 | 13.64 |
| **2221** | 3222 | 147 | 40.26 |
| **2221** | 3223 | 199 | 9.83 |
| **2221** | 1112 | 184 | 20.14 |
| **2221** | 2113 | 191 | 18.80 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2221** | 2122 | 161 | 30.66 |
| **2221** | 2123 | 186 | 18.07 |
| **2221** | 2212 | 167 | 25.87 |
| **2221** | 2213 | 194 | 15.36 |
| **2221** | 2222 | 109 | 58.12 |
| **2221** | 2223 | 170 | 22.51 |
| **2221** | 2112 | 180 | 24.80 |
| **2221** | 1121 | 103 | 48.56 |
| **2221** | 1211 | 165 | 30.37 |
| **2221** | 1221 | 36 | 105.92 |
| **2221** | 2111 | 169 | 27.19 |
| **2221** | 2121 | 81 | 67.65 |
| **2221** | 2211 | 166 | 32.69 |
| **3111** | 1113 | 179 | 24.13 |
| **3111** | 1122 | 205 | 8.76 |
| **3111** | 1123 | 211 | 6.18 |
| **3111** | 1212 | 141 | 44.30 |
| **3111** | 1213 | 172 | 24.94 |
| **3111** | 1222 | 201 | 7.52 |
| **3111** | 1223 | 210 | 4.96 |
| **3111** | 3112 | 85 | 69.89 |
| **3111** | 3113 | 145 | 38.48 |
| **3111** | 3122 | 175 | 22.32 |
| **3111** | 3123 | 201 | 10.92 |
| **3111** | 3212 | 102 | 65.81 |
| **3111** | 3213 | 153 | 36.52 |
| **3111** | 3222 | 179 | 17.25 |
| **3111** | 3223 | 202 | 10.22 |
| **3111** | 1112 | 152 | 40.41 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3111** | 2113 | 170 | 23.88 |
| **3111** | 2122 | 204 | 8.29 |
| **3111** | 2123 | 213 | 5.84 |
| **3111** | 2212 | 153 | 37.65 |
| **3111** | 2213 | 168 | 20.90 |
| **3111** | 2222 | 198 | 11.03 |
| **3111** | 2223 | 208 | 6.42 |
| **3111** | 2112 | 142 | 46.30 |
| **3111** | 1121 | 185 | 15.75 |
| **3111** | 1211 | 80 | 83.36 |
| **3111** | 1221 | 177 | 25.07 |
| **3111** | 2111 | 62 | 96.53 |
| **3111** | 2121 | 190 | 14.35 |
| **3111** | 2211 | 74 | 93.40 |
| **3111** | 2221 | 178 | 23.20 |
| **3121** | 1113 | 204 | 7.98 |
| **3121** | 1122 | 163 | 27.16 |
| **3121** | 1123 | 195 | 10.48 |
| **3121** | 1212 | 196 | 9.73 |
| **3121** | 1213 | 201 | 9.64 |
| **3121** | 1222 | 163 | 27.13 |
| **3121** | 1223 | 178 | 22.72 |
| **3121** | 3112 | 181 | 17.15 |
| **3121** | 3113 | 194 | 11.09 |
| **3121** | 3122 | 106 | 53.21 |
| **3121** | 3123 | 163 | 19.40 |
| **3121** | 3212 | 187 | 15.47 |
| **3121** | 3213 | 192 | 10.81 |
| **3121** | 3222 | 119 | 43.97 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3121** | 3223 | 146 | 35.56 |
| **3121** | 1112 | 201 | 9.27 |
| **3121** | 2113 | 200 | 9.91 |
| **3121** | 2122 | 163 | 24.61 |
| **3121** | 2123 | 199 | 15.02 |
| **3121** | 2212 | 203 | 6.85 |
| **3121** | 2213 | 203 | 8.11 |
| **3121** | 2222 | 174 | 23.18 |
| **3121** | 2223 | 186 | 19.90 |
| **3121** | 2112 | 202 | 11.11 |
| **3121** | 1121 | 96 | 54.60 |
| **3121** | 1211 | 192 | 12.80 |
| **3121** | 1221 | 136 | 44.61 |
| **3121** | 2111 | 190 | 13.44 |
| **3121** | 2121 | 99 | 68.95 |
| **3121** | 2211 | 191 | 14.45 |
| **3121** | 2221 | 122 | 51.52 |
| **3121** | 3111 | 171 | 23.49 |
| **3211** | 1113 | 171 | 25.25 |
| **3211** | 1122 | 207 | 7.41 |
| **3211** | 1123 | 211 | 4.53 |
| **3211** | 1212 | 147 | 42.94 |
| **3211** | 1213 | 162 | 28.25 |
| **3211** | 1222 | 200 | 11.03 |
| **3211** | 1223 | 207 | 4.63 |
| **3211** | 3112 | 119 | 57.95 |
| **3211** | 3113 | 149 | 40.35 |
| **3211** | 3122 | 192 | 12.65 |
| **3211** | 3123 | 204 | 11.58 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3211** | 3212 | 95 | 59.56 |
| **3211** | 3213 | 137 | 42.60 |
| **3211** | 3222 | 181 | 19.46 |
| **3211** | 3223 | 198 | 11.92 |
| **3211** | 1112 | 157 | 35.42 |
| **3211** | 2113 | 175 | 23.28 |
| **3211** | 2122 | 201 | 9.64 |
| **3211** | 2123 | 210 | 4.47 |
| **3211** | 2212 | 149 | 35.90 |
| **3211** | 2213 | 170 | 23.62 |
| **3211** | 2222 | 198 | 13.09 |
| **3211** | 2223 | 209 | 6.22 |
| **3211** | 2112 | 144 | 39.14 |
| **3211** | 1121 | 190 | 12.75 |
| **3211** | 1211 | 74 | 85.77 |
| **3211** | 1221 | 185 | 22.68 |
| **3211** | 2111 | 79 | 82.24 |
| **3211** | 2121 | 193 | 14.44 |
| **3211** | 2211 | 87 | 78.83 |
| **3211** | 2221 | 183 | 21.96 |
| **3211** | 3111 | 40 | 107.45 |
| **3211** | 3121 | 182 | 14.78 |
| **3221** | 1113 | 191 | 16.12 |
| **3221** | 1122 | 171 | 20.69 |
| **3221** | 1123 | 196 | 10.51 |
| **3221** | 1212 | 176 | 17.81 |
| **3221** | 1213 | 191 | 16.67 |
| **3221** | 1222 | 164 | 32.41 |
| **3221** | 1223 | 190 | 12.22 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3221** | 3112 | 157 | 26.71 |
| **3221** | 3113 | 183 | 19.03 |
| **3221** | 3122 | 145 | 35.82 |
| **3221** | 3123 | 182 | 16.14 |
| **3221** | 3212 | 166 | 23.15 |
| **3221** | 3213 | 187 | 16.50 |
| **3221** | 3222 | 96 | 68.85 |
| **3221** | 3223 | 157 | 29.83 |
| **3221** | 1112 | 182 | 16.00 |
| **3221** | 2113 | 189 | 18.92 |
| **3221** | 2122 | 172 | 19.56 |
| **3221** | 2123 | 194 | 14.00 |
| **3221** | 2212 | 177 | 17.48 |
| **3221** | 2213 | 191 | 16.75 |
| **3221** | 2222 | 163 | 27.24 |
| **3221** | 2223 | 194 | 14.48 |
| **3221** | 2112 | 175 | 19.95 |
| **3221** | 1121 | 117 | 51.56 |
| **3221** | 1211 | 183 | 15.49 |
| **3221** | 1221 | 110 | 66.32 |
| **3221** | 2111 | 180 | 16.30 |
| **3221** | 2121 | 131 | 44.32 |
| **3221** | 2211 | 180 | 20.01 |
| **3221** | 2221 | 88 | 70.69 |
| **3221** | 3111 | 173 | 24.12 |
| **3221** | 3121 | 68 | 82.71 |
| **3221** | 3211 | 171 | 22.90 |
| **1111** | 1113 | 153 | 34.08 |
| **1111** | 1122 | 189 | 17.24 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1111** | 1123 | 202 | 9.41 |
| **1111** | 1212 | 118 | 61.04 |
| **1111** | 1213 | 157 | 35.99 |
| **1111** | 1222 | 186 | 15.11 |
| **1111** | 1223 | 203 | 9.55 |
| **1111** | 3112 | 134 | 48.68 |
| **1111** | 3113 | 161 | 28.24 |
| **1111** | 3122 | 204 | 8.16 |
| **1111** | 3123 | 210 | 7.27 |
| **1111** | 3212 | 139 | 47.42 |
| **1111** | 3213 | 167 | 26.74 |
| **1111** | 3222 | 194 | 11.88 |
| **1111** | 3223 | 210 | 8.32 |
| **1111** | 1112 | 100 | 65.21 |
| **1111** | 2113 | 143 | 35.70 |
| **1111** | 2122 | 187 | 18.38 |
| **1111** | 2123 | 198 | 13.10 |
| **1111** | 2212 | 112 | 63.30 |
| **1111** | 2213 | 153 | 32.49 |
| **1111** | 2222 | 184 | 17.11 |
| **1111** | 2223 | 201 | 10.64 |
| **1111** | 2112 | 99 | 65.94 |
| **1111** | 1121 | 176 | 22.30 |
| **1111** | 1211 | 31 | 124.21 |
| **1111** | 1221 | 169 | 26.35 |
| **1111** | 2111 | 37 | 113.42 |
| **1111** | 2121 | 183 | 19.21 |
| **1111** | 2211 | 64 | 95.75 |
| **1111** | 2221 | 165 | 29.76 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1111** | 3111 | 76 | 84.70 |
| **1111** | 3121 | 191 | 14.25 |
| **1111** | 3211 | 80 | 85.63 |
| **1111** | 3221 | 184 | 16.24 |
| **1131** | 1113 | 196 | 10.65 |
| **1131** | 1122 | 96 | 63.79 |
| **1131** | 1123 | 163 | 27.30 |
| **1131** | 1212 | 176 | 20.24 |
| **1131** | 1213 | 199 | 11.72 |
| **1131** | 1222 | 140 | 35.98 |
| **1131** | 1223 | 148 | 32.48 |
| **1131** | 3112 | 188 | 15.94 |
| **1131** | 3113 | 204 | 7.30 |
| **1131** | 3122 | 134 | 39.84 |
| **1131** | 3123 | 183 | 14.21 |
| **1131** | 3212 | 189 | 15.39 |
| **1131** | 3213 | 201 | 8.77 |
| **1131** | 3222 | 159 | 34.41 |
| **1131** | 3223 | 166 | 30.04 |
| **1131** | 1112 | 183 | 16.19 |
| **1131** | 2113 | 201 | 11.25 |
| **1131** | 2122 | 98 | 63.50 |
| **1131** | 2123 | 155 | 32.46 |
| **1131** | 2212 | 182 | 17.02 |
| **1131** | 2213 | 202 | 9.48 |
| **1131** | 2222 | 130 | 45.91 |
| **1131** | 2223 | 154 | 29.96 |
| **1131** | 2112 | 181 | 20.25 |
| **1131** | 1121 | 96 | 61.24 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1131** | 1211 | 178 | 26.39 |
| **1131** | 1221 | 126 | 43.10 |
| **1131** | 2111 | 177 | 27.58 |
| **1131** | 2121 | 83 | 68.94 |
| **1131** | 2211 | 178 | 21.89 |
| **1131** | 2221 | 136 | 42.75 |
| **1131** | 3111 | 193 | 15.72 |
| **1131** | 3121 | 137 | 40.69 |
| **1131** | 3211 | 192 | 14.67 |
| **1131** | 3221 | 156 | 26.44 |
| **1131** | 1111 | 178 | 25.52 |
| **1132** | 1113 | 196 | 13.58 |
| **1132** | 1122 | 114 | 53.04 |
| **1132** | 1123 | 143 | 35.08 |
| **1132** | 1212 | 174 | 19.58 |
| **1132** | 1213 | 193 | 10.71 |
| **1132** | 1222 | 138 | 31.58 |
| **1132** | 1223 | 160 | 28.96 |
| **1132** | 3112 | 192 | 12.49 |
| **1132** | 3113 | 208 | 8.68 |
| **1132** | 3122 | 150 | 32.53 |
| **1132** | 3123 | 155 | 29.25 |
| **1132** | 3212 | 189 | 16.46 |
| **1132** | 3213 | 200 | 10.73 |
| **1132** | 3222 | 171 | 22.21 |
| **1132** | 3223 | 175 | 21.88 |
| **1132** | 1112 | 177 | 19.86 |
| **1132** | 2113 | 192 | 15.98 |
| **1132** | 2122 | 115 | 45.29 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1132** | 2123 | 144 | 35.42 |
| **1132** | 2212 | 178 | 20.85 |
| **1132** | 2213 | 198 | 10.41 |
| **1132** | 2222 | 143 | 30.31 |
| **1132** | 2223 | 163 | 30.29 |
| **1132** | 2112 | 177 | 17.92 |
| **1132** | 1121 | 140 | 36.02 |
| **1132** | 1211 | 195 | 13.43 |
| **1132** | 1221 | 167 | 22.02 |
| **1132** | 2111 | 190 | 13.17 |
| **1132** | 2121 | 160 | 26.46 |
| **1132** | 2211 | 193 | 14.05 |
| **1132** | 2221 | 180 | 19.28 |
| **1132** | 3111 | 209 | 8.90 |
| **1132** | 3121 | 189 | 14.72 |
| **1132** | 3211 | 204 | 8.23 |
| **1132** | 3221 | 197 | 7.87 |
| **1132** | 1111 | 192 | 16.47 |
| **1132** | 1131 | 118 | 51.08 |
| **1133** | 1113 | 165 | 30.21 |
| **1133** | 1122 | 173 | 21.10 |
| **1133** | 1123 | 119 | 46.45 |
| **1133** | 1212 | 206 | 10.91 |
| **1133** | 1213 | 182 | 16.92 |
| **1133** | 1222 | 181 | 19.27 |
| **1133** | 1223 | 140 | 32.35 |
| **1133** | 3112 | 213 | 6.21 |
| **1133** | 3113 | 185 | 21.00 |
| **1133** | 3122 | 190 | 11.77 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1133** | 3123 | 165 | 23.06 |
| **1133** | 3212 | 210 | 5.19 |
| **1133** | 3213 | 186 | 15.71 |
| **1133** | 3222 | 201 | 9.39 |
| **1133** | 3223 | 158 | 35.45 |
| **1133** | 1112 | 200 | 8.35 |
| **1133** | 2113 | 162 | 25.45 |
| **1133** | 2122 | 174 | 22.34 |
| **1133** | 2123 | 123 | 38.46 |
| **1133** | 2212 | 206 | 10.02 |
| **1133** | 2213 | 176 | 19.95 |
| **1133** | 2222 | 182 | 21.37 |
| **1133** | 2223 | 147 | 29.21 |
| **1133** | 2112 | 202 | 9.08 |
| **1133** | 1121 | 178 | 21.91 |
| **1133** | 1211 | 208 | 8.90 |
| **1133** | 1221 | 187 | 14.66 |
| **1133** | 2111 | 204 | 9.21 |
| **1133** | 2121 | 184 | 18.83 |
| **1133** | 2211 | 204 | 9.48 |
| **1133** | 2221 | 186 | 16.44 |
| **1133** | 3111 | 215 | 3.98 |
| **1133** | 3121 | 205 | 6.63 |
| **1133** | 3211 | 213 | 4.64 |
| **1133** | 3221 | 205 | 6.97 |
| **1133** | 1111 | 204 | 10.49 |
| **1133** | 1131 | 168 | 24.28 |
| **1133** | 1132 | 155 | 28.98 |
| **1231** | 1113 | 188 | 19.29 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1231** | 1122 | 149 | 30.06 |
| **1231** | 1123 | 186 | 14.55 |
| **1231** | 1212 | 165 | 24.49 |
| **1231** | 1213 | 182 | 16.42 |
| **1231** | 1222 | 101 | 53.68 |
| **1231** | 1223 | 163 | 26.06 |
| **1231** | 3112 | 181 | 23.37 |
| **1231** | 3113 | 198 | 13.70 |
| **1231** | 3122 | 165 | 27.34 |
| **1231** | 3123 | 201 | 9.13 |
| **1231** | 3212 | 183 | 22.00 |
| **1231** | 3213 | 189 | 12.55 |
| **1231** | 3222 | 137 | 40.59 |
| **1231** | 3223 | 191 | 11.59 |
| **1231** | 1112 | 181 | 19.78 |
| **1231** | 2113 | 186 | 17.58 |
| **1231** | 2122 | 150 | 29.68 |
| **1231** | 2123 | 179 | 16.39 |
| **1231** | 2212 | 167 | 25.32 |
| **1231** | 2213 | 187 | 18.22 |
| **1231** | 2222 | 101 | 59.53 |
| **1231** | 2223 | 167 | 23.23 |
| **1231** | 2112 | 176 | 24.04 |
| **1231** | 1121 | 144 | 32.74 |
| **1231** | 1211 | 172 | 27.00 |
| **1231** | 1221 | 107 | 59.74 |
| **1231** | 2111 | 182 | 17.94 |
| **1231** | 2121 | 138 | 37.58 |
| **1231** | 2211 | 174 | 30.53 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1231** | 2221 | 116 | 55.33 |
| **1231** | 3111 | 186 | 16.89 |
| **1231** | 3121 | 169 | 21.32 |
| **1231** | 3211 | 197 | 14.79 |
| **1231** | 3221 | 156 | 26.84 |
| **1231** | 1111 | 177 | 26.75 |
| **1231** | 1131 | 88 | 67.15 |
| **1231** | 1132 | 152 | 35.55 |
| **1231** | 1133 | 184 | 16.19 |
| **1232** | 1113 | 192 | 12.93 |
| **1232** | 1122 | 134 | 36.69 |
| **1232** | 1123 | 183 | 14.23 |
| **1232** | 1212 | 163 | 25.64 |
| **1232** | 1213 | 195 | 15.09 |
| **1232** | 1222 | 105 | 56.79 |
| **1232** | 1223 | 148 | 30.78 |
| **1232** | 3112 | 185 | 16.02 |
| **1232** | 3113 | 198 | 12.06 |
| **1232** | 3122 | 163 | 24.50 |
| **1232** | 3123 | 192 | 12.41 |
| **1232** | 3212 | 182 | 19.50 |
| **1232** | 3213 | 201 | 11.29 |
| **1232** | 3222 | 151 | 40.84 |
| **1232** | 3223 | 175 | 18.85 |
| **1232** | 1112 | 174 | 25.14 |
| **1232** | 2113 | 186 | 16.39 |
| **1232** | 2122 | 134 | 34.47 |
| **1232** | 2123 | 182 | 17.23 |
| **1232** | 2212 | 176 | 23.13 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1232** | 2213 | 187 | 15.06 |
| **1232** | 2222 | 109 | 49.51 |
| **1232** | 2223 | 155 | 29.24 |
| **1232** | 2112 | 174 | 19.68 |
| **1232** | 1121 | 153 | 37.45 |
| **1232** | 1211 | 188 | 17.77 |
| **1232** | 1221 | 146 | 33.17 |
| **1232** | 2111 | 192 | 14.89 |
| **1232** | 2121 | 156 | 28.27 |
| **1232** | 2211 | 185 | 18.91 |
| **1232** | 2221 | 143 | 31.85 |
| **1232** | 3111 | 201 | 8.35 |
| **1232** | 3121 | 185 | 15.82 |
| **1232** | 3211 | 200 | 13.23 |
| **1232** | 3221 | 176 | 23.34 |
| **1232** | 1111 | 192 | 14.52 |
| **1232** | 1131 | 142 | 36.48 |
| **1232** | 1132 | 81 | 63.94 |
| **1232** | 1133 | 175 | 24.96 |
| **1232** | 1231 | 113 | 44.21 |
| **1233** | 1113 | 177 | 26.06 |
| **1233** | 1122 | 162 | 31.80 |
| **1233** | 1123 | 112 | 52.69 |
| **1233** | 1212 | 202 | 8.76 |
| **1233** | 1213 | 171 | 19.29 |
| **1233** | 1222 | 169 | 24.35 |
| **1233** | 1223 | 116 | 46.17 |
| **1233** | 3112 | 215 | 4.58 |
| **1233** | 3113 | 186 | 18.49 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1233** | 3122 | 168 | 23.80 |
| **1233** | 3123 | 157 | 26.99 |
| **1233** | 3212 | 211 | 4.68 |
| **1233** | 3213 | 185 | 16.48 |
| **1233** | 3222 | 194 | 11.81 |
| **1233** | 3223 | 136 | 37.30 |
| **1233** | 1112 | 204 | 9.50 |
| **1233** | 2113 | 169 | 23.03 |
| **1233** | 2122 | 151 | 37.84 |
| **1233** | 2123 | 133 | 39.37 |
| **1233** | 2212 | 199 | 10.40 |
| **1233** | 2213 | 168 | 17.87 |
| **1233** | 2222 | 168 | 22.89 |
| **1233** | 2223 | 124 | 45.29 |
| **1233** | 2112 | 202 | 8.80 |
| **1233** | 1121 | 175 | 21.93 |
| **1233** | 1211 | 207 | 11.41 |
| **1233** | 1221 | 179 | 15.43 |
| **1233** | 2111 | 207 | 9.24 |
| **1233** | 2121 | 177 | 21.29 |
| **1233** | 2211 | 202 | 9.97 |
| **1233** | 2221 | 176 | 20.04 |
| **1233** | 3111 | 213 | 5.08 |
| **1233** | 3121 | 188 | 15.78 |
| **1233** | 3211 | 210 | 6.23 |
| **1233** | 3221 | 200 | 11.16 |
| **1233** | 1111 | 208 | 8.99 |
| **1233** | 1131 | 148 | 34.25 |
| **1233** | 1132 | 148 | 35.76 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **1233** | 1133 | 73 | 76.00 |
| **1233** | 1231 | 170 | 19.10 |
| **1233** | 1232 | 156 | 27.69 |
| **2131** | 1113 | 202 | 6.44 |
| **2131** | 1122 | 108 | 57.67 |
| **2131** | 1123 | 176 | 23.58 |
| **2131** | 1212 | 177 | 15.59 |
| **2131** | 1213 | 199 | 10.50 |
| **2131** | 1222 | 154 | 28.01 |
| **2131** | 1223 | 163 | 30.85 |
| **2131** | 3112 | 189 | 11.83 |
| **2131** | 3113 | 211 | 5.47 |
| **2131** | 3122 | 141 | 42.80 |
| **2131** | 3123 | 193 | 12.47 |
| **2131** | 3212 | 194 | 15.21 |
| **2131** | 3213 | 208 | 6.28 |
| **2131** | 3222 | 165 | 27.69 |
| **2131** | 3223 | 170 | 27.89 |
| **2131** | 1112 | 185 | 15.34 |
| **2131** | 2113 | 201 | 10.03 |
| **2131** | 2122 | 101 | 62.25 |
| **2131** | 2123 | 169 | 24.90 |
| **2131** | 2212 | 184 | 14.39 |
| **2131** | 2213 | 203 | 9.00 |
| **2131** | 2222 | 144 | 32.69 |
| **2131** | 2223 | 168 | 28.71 |
| **2131** | 2112 | 180 | 19.66 |
| **2131** | 1121 | 125 | 42.67 |
| **2131** | 1211 | 185 | 11.99 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2131** | 1221 | 146 | 32.84 |
| **2131** | 2111 | 189 | 14.04 |
| **2131** | 2121 | 105 | 52.80 |
| **2131** | 2211 | 183 | 11.98 |
| **2131** | 2221 | 147 | 31.39 |
| **2131** | 3111 | 193 | 14.45 |
| **2131** | 3121 | 149 | 30.60 |
| **2131** | 3211 | 197 | 14.04 |
| **2131** | 3221 | 174 | 19.45 |
| **2131** | 1111 | 188 | 13.94 |
| **2131** | 1131 | 48 | 93.60 |
| **2131** | 1132 | 120 | 46.79 |
| **2131** | 1133 | 169 | 24.02 |
| **2131** | 1231 | 102 | 65.93 |
| **2131** | 1232 | 141 | 37.57 |
| **2131** | 1233 | 154 | 34.04 |
| **2132** | 1113 | 200 | 10.17 |
| **2132** | 1122 | 115 | 50.03 |
| **2132** | 1123 | 148 | 36.57 |
| **2132** | 1212 | 178 | 18.96 |
| **2132** | 1213 | 195 | 11.69 |
| **2132** | 1222 | 144 | 39.09 |
| **2132** | 1223 | 164 | 24.38 |
| **2132** | 3112 | 193 | 11.90 |
| **2132** | 3113 | 205 | 7.35 |
| **2132** | 3122 | 158 | 26.36 |
| **2132** | 3123 | 166 | 25.87 |
| **2132** | 3212 | 183 | 17.33 |
| **2132** | 3213 | 199 | 8.35 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2132** | 3222 | 176 | 20.59 |
| **2132** | 3223 | 172 | 23.47 |
| **2132** | 1112 | 179 | 17.49 |
| **2132** | 2113 | 195 | 11.01 |
| **2132** | 2122 | 114 | 47.34 |
| **2132** | 2123 | 153 | 32.40 |
| **2132** | 2212 | 175 | 21.46 |
| **2132** | 2213 | 200 | 7.93 |
| **2132** | 2222 | 152 | 36.23 |
| **2132** | 2223 | 158 | 31.46 |
| **2132** | 2112 | 169 | 23.60 |
| **2132** | 1121 | 150 | 31.76 |
| **2132** | 1211 | 190 | 14.63 |
| **2132** | 1221 | 171 | 20.11 |
| **2132** | 2111 | 192 | 14.41 |
| **2132** | 2121 | 154 | 26.90 |
| **2132** | 2211 | 196 | 14.89 |
| **2132** | 2221 | 177 | 21.07 |
| **2132** | 3111 | 205 | 7.14 |
| **2132** | 3121 | 188 | 14.81 |
| **2132** | 3211 | 207 | 7.63 |
| **2132** | 3221 | 195 | 8.87 |
| **2132** | 1111 | 190 | 17.92 |
| **2132** | 1131 | 123 | 52.14 |
| **2132** | 1132 | 32 | 94.54 |
| **2132** | 1133 | 155 | 28.81 |
| **2132** | 1231 | 156 | 29.21 |
| **2132** | 1232 | 101 | 60.24 |
| **2132** | 1233 | 149 | 38.23 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2132** | 2131 | 114 | 52.72 |
| **2133** | 1113 | 170 | 30.00 |
| **2133** | 1122 | 173 | 22.31 |
| **2133** | 1123 | 105 | 55.98 |
| **2133** | 1212 | 205 | 8.32 |
| **2133** | 1213 | 185 | 13.09 |
| **2133** | 1222 | 185 | 16.78 |
| **2133** | 1223 | 123 | 50.21 |
| **2133** | 3112 | 216 | 3.49 |
| **2133** | 3113 | 184 | 17.87 |
| **2133** | 3122 | 193 | 12.42 |
| **2133** | 3123 | 149 | 27.36 |
| **2133** | 3212 | 213 | 5.50 |
| **2133** | 3213 | 180 | 19.25 |
| **2133** | 3222 | 204 | 7.78 |
| **2133** | 3223 | 153 | 31.62 |
| **2133** | 1112 | 203 | 10.44 |
| **2133** | 2113 | 169 | 28.79 |
| **2133** | 2122 | 174 | 21.33 |
| **2133** | 2123 | 108 | 56.36 |
| **2133** | 2212 | 206 | 7.33 |
| **2133** | 2213 | 175 | 23.98 |
| **2133** | 2222 | 181 | 17.58 |
| **2133** | 2223 | 132 | 42.83 |
| **2133** | 2112 | 205 | 10.14 |
| **2133** | 1121 | 176 | 22.04 |
| **2133** | 1211 | 207 | 8.30 |
| **2133** | 1221 | 191 | 14.21 |
| **2133** | 2111 | 205 | 8.47 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2133** | 2121 | 183 | 19.42 |
| **2133** | 2211 | 208 | 6.97 |
| **2133** | 2221 | 190 | 13.51 |
| **2133** | 3111 | 215 | 5.26 |
| **2133** | 3121 | 203 | 6.28 |
| **2133** | 3211 | 216 | 3.85 |
| **2133** | 3221 | 209 | 6.96 |
| **2133** | 1111 | 203 | 10.17 |
| **2133** | 1131 | 176 | 22.23 |
| **2133** | 1132 | 154 | 27.80 |
| **2133** | 1133 | 20 | 113.02 |
| **2133** | 1231 | 189 | 13.58 |
| **2133** | 1232 | 175 | 18.66 |
| **2133** | 1233 | 82 | 68.32 |
| **2133** | 2131 | 162 | 22.54 |
| **2133** | 2132 | 150 | 31.31 |
| **2231** | 1113 | 184 | 17.07 |
| **2231** | 1122 | 154 | 24.61 |
| **2231** | 1123 | 191 | 12.09 |
| **2231** | 1212 | 173 | 25.32 |
| **2231** | 1213 | 180 | 19.37 |
| **2231** | 1222 | 106 | 51.93 |
| **2231** | 1223 | 166 | 20.60 |
| **2231** | 3112 | 183 | 21.97 |
| **2231** | 3113 | 193 | 13.05 |
| **2231** | 3122 | 170 | 22.37 |
| **2231** | 3123 | 200 | 10.70 |
| **2231** | 3212 | 183 | 17.03 |
| **2231** | 3213 | 192 | 11.45 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2231** | 3222 | 146 | 42.17 |
| **2231** | 3223 | 196 | 13.43 |
| **2231** | 1112 | 181 | 18.98 |
| **2231** | 2113 | 181 | 17.66 |
| **2231** | 2122 | 150 | 30.19 |
| **2231** | 2123 | 189 | 13.08 |
| **2231** | 2212 | 161 | 24.75 |
| **2231** | 2213 | 187 | 17.38 |
| **2231** | 2222 | 96 | 56.32 |
| **2231** | 2223 | 172 | 23.61 |
| **2231** | 2112 | 172 | 17.18 |
| **2231** | 1121 | 147 | 33.34 |
| **2231** | 1211 | 173 | 24.30 |
| **2231** | 1221 | 101 | 49.43 |
| **2231** | 2111 | 176 | 21.65 |
| **2231** | 2121 | 131 | 37.48 |
| **2231** | 2211 | 168 | 26.37 |
| **2231** | 2221 | 112 | 53.48 |
| **2231** | 3111 | 185 | 15.65 |
| **2231** | 3121 | 166 | 21.71 |
| **2231** | 3211 | 190 | 15.78 |
| **2231** | 3221 | 152 | 29.22 |
| **2231** | 1111 | 181 | 21.43 |
| **2231** | 1131 | 116 | 52.13 |
| **2231** | 1132 | 161 | 26.58 |
| **2231** | 1133 | 183 | 19.38 |
| **2231** | 1231 | 32 | 110.64 |
| **2231** | 1232 | 107 | 60.71 |
| **2231** | 1233 | 173 | 20.52 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2231** | 2131 | 77 | 82.16 |
| **2231** | 2132 | 158 | 30.43 |
| **2231** | 2133 | 184 | 13.06 |
| **2232** | 1113 | 197 | 11.60 |
| **2232** | 1122 | 115 | 45.62 |
| **2232** | 1123 | 182 | 16.07 |
| **2232** | 1212 | 175 | 24.45 |
| **2232** | 1213 | 191 | 15.42 |
| **2232** | 1222 | 104 | 58.57 |
| **2232** | 1223 | 135 | 38.72 |
| **2232** | 3112 | 187 | 15.44 |
| **2232** | 3113 | 205 | 8.88 |
| **2232** | 3122 | 158 | 28.46 |
| **2232** | 3123 | 190 | 12.36 |
| **2232** | 3212 | 184 | 19.74 |
| **2232** | 3213 | 205 | 10.44 |
| **2232** | 3222 | 154 | 32.57 |
| **2232** | 3223 | 175 | 23.08 |
| **2232** | 1112 | 181 | 18.45 |
| **2232** | 2113 | 195 | 13.83 |
| **2232** | 2122 | 127 | 43.09 |
| **2232** | 2123 | 178 | 19.54 |
| **2232** | 2212 | 172 | 25.06 |
| **2232** | 2213 | 197 | 14.61 |
| **2232** | 2222 | 121 | 45.35 |
| **2232** | 2223 | 133 | 38.34 |
| **2232** | 2112 | 184 | 21.51 |
| **2232** | 1121 | 141 | 41.90 |
| **2232** | 1211 | 184 | 19.13 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2232** | 1221 | 153 | 36.42 |
| **2232** | 2111 | 195 | 14.43 |
| **2232** | 2121 | 145 | 39.42 |
| **2232** | 2211 | 192 | 16.46 |
| **2232** | 2221 | 159 | 26.40 |
| **2232** | 3111 | 209 | 7.14 |
| **2232** | 3121 | 179 | 22.33 |
| **2232** | 3211 | 203 | 9.63 |
| **2232** | 3221 | 185 | 16.27 |
| **2232** | 1111 | 189 | 17.72 |
| **2232** | 1131 | 135 | 44.95 |
| **2232** | 1132 | 97 | 62.91 |
| **2232** | 1133 | 171 | 23.75 |
| **2232** | 1231 | 126 | 43.49 |
| **2232** | 1232 | 25 | 104.32 |
| **2232** | 1233 | 154 | 30.22 |
| **2232** | 2131 | 127 | 40.85 |
| **2232** | 2132 | 73 | 93.91 |
| **2232** | 2133 | 170 | 24.99 |
| **2232** | 2231 | 115 | 49.97 |
| **2233** | 1113 | 172 | 25.38 |
| **2233** | 1122 | 154 | 38.06 |
| **2233** | 1123 | 111 | 63.80 |
| **2233** | 1212 | 197 | 10.40 |
| **2233** | 1213 | 176 | 16.97 |
| **2233** | 1222 | 165 | 26.56 |
| **2233** | 1223 | 112 | 51.34 |
| **2233** | 3112 | 213 | 4.74 |
| **2233** | 3113 | 185 | 22.30 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2233** | 3122 | 174 | 29.17 |
| **2233** | 3123 | 165 | 22.09 |
| **2233** | 3212 | 210 | 6.47 |
| **2233** | 3213 | 183 | 19.62 |
| **2233** | 3222 | 197 | 9.24 |
| **2233** | 3223 | 139 | 41.91 |
| **2233** | 1112 | 201 | 11.09 |
| **2233** | 2113 | 173 | 26.90 |
| **2233** | 2122 | 146 | 35.42 |
| **2233** | 2123 | 127 | 43.48 |
| **2233** | 2212 | 201 | 11.15 |
| **2233** | 2213 | 164 | 24.20 |
| **2233** | 2222 | 163 | 23.88 |
| **2233** | 2223 | 114 | 50.39 |
| **2233** | 2112 | 205 | 10.69 |
| **2233** | 1121 | 167 | 26.49 |
| **2233** | 1211 | 200 | 11.94 |
| **2233** | 1221 | 177 | 17.78 |
| **2233** | 2111 | 204 | 8.30 |
| **2233** | 2121 | 168 | 22.29 |
| **2233** | 2211 | 202 | 8.55 |
| **2233** | 2221 | 178 | 19.67 |
| **2233** | 3111 | 212 | 5.99 |
| **2233** | 3121 | 188 | 13.05 |
| **2233** | 3211 | 211 | 4.93 |
| **2233** | 3221 | 200 | 10.22 |
| **2233** | 1111 | 204 | 10.03 |
| **2233** | 1131 | 155 | 37.36 |
| **2233** | 1132 | 150 | 32.16 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **2233** | 1133 | 82 | 76.86 |
| **2233** | 1231 | 181 | 19.82 |
| **2233** | 1232 | 157 | 27.99 |
| **2233** | 1233 | 19 | 101.11 |
| **2233** | 2131 | 147 | 35.77 |
| **2233** | 2132 | 143 | 35.27 |
| **2233** | 2133 | 75 | 74.10 |
| **2233** | 2231 | 171 | 22.73 |
| **2233** | 2232 | 144 | 35.92 |
| **3131** | 1113 | 210 | 5.18 |
| **3131** | 1122 | 162 | 30.24 |
| **3131** | 1123 | 201 | 8.79 |
| **3131** | 1212 | 189 | 12.48 |
| **3131** | 1213 | 204 | 8.99 |
| **3131** | 1222 | 180 | 20.68 |
| **3131** | 1223 | 184 | 19.40 |
| **3131** | 3112 | 175 | 20.42 |
| **3131** | 3113 | 197 | 11.99 |
| **3131** | 3122 | 104 | 55.98 |
| **3131** | 3123 | 165 | 24.93 |
| **3131** | 3212 | 179 | 15.61 |
| **3131** | 3213 | 196 | 8.37 |
| **3131** | 3222 | 142 | 31.96 |
| **3131** | 3223 | 152 | 38.54 |
| **3131** | 1112 | 194 | 12.19 |
| **3131** | 2113 | 206 | 7.16 |
| **3131** | 2122 | 155 | 30.75 |
| **3131** | 2123 | 195 | 12.90 |
| **3131** | 2212 | 199 | 9.46 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3131** | 2213 | 214 | 4.08 |
| **3131** | 2222 | 164 | 22.82 |
| **3131** | 2223 | 177 | 19.99 |
| **3131** | 2112 | 191 | 14.20 |
| **3131** | 1121 | 157 | 32.32 |
| **3131** | 1211 | 195 | 15.38 |
| **3131** | 1221 | 167 | 28.78 |
| **3131** | 2111 | 188 | 14.22 |
| **3131** | 2121 | 130 | 44.16 |
| **3131** | 2211 | 193 | 13.04 |
| **3131** | 2221 | 165 | 29.47 |
| **3131** | 3111 | 173 | 26.83 |
| **3131** | 3121 | 82 | 71.11 |
| **3131** | 3211 | 182 | 17.44 |
| **3131** | 3221 | 123 | 43.84 |
| **3131** | 1111 | 194 | 12.50 |
| **3131** | 1131 | 102 | 64.97 |
| **3131** | 1132 | 172 | 18.30 |
| **3131** | 1133 | 192 | 11.51 |
| **3131** | 1231 | 145 | 36.70 |
| **3131** | 1232 | 181 | 16.05 |
| **3131** | 1233 | 178 | 17.44 |
| **3131** | 2131 | 108 | 54.66 |
| **3131** | 2132 | 179 | 20.01 |
| **3131** | 2133 | 201 | 7.24 |
| **3131** | 2231 | 141 | 31.46 |
| **3131** | 2232 | 180 | 22.80 |
| **3131** | 2233 | 179 | 18.59 |
| **3132** | 1113 | 206 | 5.82 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3132** | 1122 | 142 | 32.70 |
| **3132** | 1123 | 191 | 11.04 |
| **3132** | 1212 | 186 | 13.66 |
| **3132** | 1213 | 205 | 7.65 |
| **3132** | 1222 | 164 | 24.32 |
| **3132** | 1223 | 172 | 20.12 |
| **3132** | 3112 | 175 | 19.17 |
| **3132** | 3113 | 191 | 10.41 |
| **3132** | 3122 | 99 | 55.19 |
| **3132** | 3123 | 143 | 31.31 |
| **3132** | 3212 | 170 | 27.23 |
| **3132** | 3213 | 198 | 8.42 |
| **3132** | 3222 | 149 | 31.39 |
| **3132** | 3223 | 138 | 34.85 |
| **3132** | 1112 | 189 | 13.99 |
| **3132** | 2113 | 206 | 6.84 |
| **3132** | 2122 | 147 | 36.63 |
| **3132** | 2123 | 194 | 13.22 |
| **3132** | 2212 | 190 | 12.76 |
| **3132** | 2213 | 209 | 4.07 |
| **3132** | 2222 | 167 | 25.68 |
| **3132** | 2223 | 172 | 27.13 |
| **3132** | 2112 | 185 | 21.22 |
| **3132** | 1121 | 179 | 23.00 |
| **3132** | 1211 | 196 | 11.03 |
| **3132** | 1221 | 196 | 10.32 |
| **3132** | 2111 | 201 | 11.88 |
| **3132** | 2121 | 177 | 21.16 |
| **3132** | 2211 | 202 | 10.65 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3132** | 2221 | 198 | 14.52 |
| **3132** | 3111 | 183 | 18.27 |
| **3132** | 3121 | 126 | 44.31 |
| **3132** | 3211 | 189 | 12.30 |
| **3132** | 3221 | 163 | 27.09 |
| **3132** | 1111 | 193 | 12.21 |
| **3132** | 1131 | 154 | 29.26 |
| **3132** | 1132 | 93 | 56.82 |
| **3132** | 1133 | 185 | 16.72 |
| **3132** | 1231 | 178 | 14.61 |
| **3132** | 1232 | 119 | 53.30 |
| **3132** | 1233 | 177 | 25.16 |
| **3132** | 2131 | 152 | 30.65 |
| **3132** | 2132 | 95 | 68.66 |
| **3132** | 2133 | 188 | 12.79 |
| **3132** | 2231 | 182 | 16.11 |
| **3132** | 2232 | 115 | 49.57 |
| **3132** | 2233 | 173 | 25.76 |
| **3132** | 3131 | 124 | 46.47 |
| **3133** | 1113 | 180 | 14.78 |
| **3133** | 1122 | 197 | 11.80 |
| **3133** | 1123 | 150 | 31.32 |
| **3133** | 1212 | 208 | 8.80 |
| **3133** | 1213 | 186 | 19.16 |
| **3133** | 1222 | 199 | 6.80 |
| **3133** | 1223 | 158 | 20.09 |
| **3133** | 3112 | 194 | 12.74 |
| **3133** | 3113 | 155 | 25.29 |
| **3133** | 3122 | 164 | 24.22 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3133** | 3123 | 96 | 61.43 |
| **3133** | 3212 | 202 | 12.28 |
| **3133** | 3213 | 169 | 21.47 |
| **3133** | 3222 | 181 | 18.52 |
| **3133** | 3223 | 130 | 36.63 |
| **3133** | 1112 | 206 | 7.34 |
| **3133** | 2113 | 183 | 14.03 |
| **3133** | 2122 | 187 | 12.67 |
| **3133** | 2123 | 124 | 47.53 |
| **3133** | 2212 | 210 | 5.45 |
| **3133** | 2213 | 180 | 17.07 |
| **3133** | 2222 | 197 | 10.09 |
| **3133** | 2223 | 150 | 32.15 |
| **3133** | 2112 | 201 | 9.90 |
| **3133** | 1121 | 196 | 11.80 |
| **3133** | 1211 | 210 | 6.44 |
| **3133** | 1221 | 205 | 7.19 |
| **3133** | 2111 | 208 | 6.45 |
| **3133** | 2121 | 202 | 7.84 |
| **3133** | 2211 | 207 | 6.64 |
| **3133** | 2221 | 206 | 7.64 |
| **3133** | 3111 | 198 | 14.49 |
| **3133** | 3121 | 166 | 25.92 |
| **3133** | 3211 | 203 | 8.71 |
| **3133** | 3221 | 183 | 16.48 |
| **3133** | 1111 | 206 | 7.43 |
| **3133** | 1131 | 191 | 13.31 |
| **3133** | 1132 | 171 | 20.10 |
| **3133** | 1133 | 123 | 40.04 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3133** | 1231 | 200 | 9.87 |
| **3133** | 1232 | 191 | 19.49 |
| **3133** | 1233 | 144 | 23.53 |
| **3133** | 2131 | 186 | 13.41 |
| **3133** | 2132 | 176 | 18.76 |
| **3133** | 2133 | 114 | 44.95 |
| **3133** | 2231 | 193 | 13.74 |
| **3133** | 2232 | 187 | 16.46 |
| **3133** | 2233 | 151 | 24.45 |
| **3133** | 3131 | 165 | 26.33 |
| **3133** | 3132 | 143 | 36.71 |
| **3231** | 1113 | 199 | 10.62 |
| **3231** | 1122 | 186 | 15.96 |
| **3231** | 1123 | 201 | 8.84 |
| **3231** | 1212 | 187 | 17.34 |
| **3231** | 1213 | 196 | 11.45 |
| **3231** | 1222 | 159 | 31.32 |
| **3231** | 1223 | 194 | 10.49 |
| **3231** | 3112 | 175 | 23.37 |
| **3231** | 3113 | 189 | 11.98 |
| **3231** | 3122 | 141 | 29.37 |
| **3231** | 3123 | 177 | 16.32 |
| **3231** | 3212 | 175 | 20.36 |
| **3231** | 3213 | 193 | 12.28 |
| **3231** | 3222 | 80 | 76.14 |
| **3231** | 3223 | 164 | 27.07 |
| **3231** | 1112 | 196 | 13.49 |
| **3231** | 2113 | 197 | 9.51 |
| **3231** | 2122 | 170 | 21.49 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3231** | 2123 | 197 | 10.92 |
| **3231** | 2212 | 189 | 15.56 |
| **3231** | 2213 | 203 | 11.31 |
| **3231** | 2222 | 150 | 36.23 |
| **3231** | 2223 | 199 | 7.89 |
| **3231** | 2112 | 186 | 12.67 |
| **3231** | 1121 | 144 | 30.59 |
| **3231** | 1211 | 187 | 12.44 |
| **3231** | 1221 | 154 | 35.82 |
| **3231** | 2111 | 185 | 15.26 |
| **3231** | 2121 | 127 | 40.33 |
| **3231** | 2211 | 185 | 14.62 |
| **3231** | 2221 | 142 | 32.52 |
| **3231** | 3111 | 173 | 24.69 |
| **3231** | 3121 | 108 | 47.29 |
| **3231** | 3211 | 174 | 20.03 |
| **3231** | 3221 | 85 | 65.03 |
| **3231** | 1111 | 190 | 10.22 |
| **3231** | 1131 | 128 | 46.03 |
| **3231** | 1132 | 192 | 12.73 |
| **3231** | 1133 | 203 | 7.91 |
| **3231** | 1231 | 123 | 50.55 |
| **3231** | 1232 | 167 | 28.42 |
| **3231** | 1233 | 203 | 10.50 |
| **3231** | 2131 | 135 | 44.13 |
| **3231** | 2132 | 193 | 13.99 |
| **3231** | 2133 | 206 | 6.00 |
| **3231** | 2231 | 127 | 46.11 |
| **3231** | 2232 | 175 | 23.90 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3231** | 2233 | 203 | 7.30 |
| **3231** | 3131 | 68 | 93.80 |
| **3231** | 3132 | 150 | 29.71 |
| **3231** | 3133 | 177 | 16.83 |
| **3232** | 1113 | 198 | 10.66 |
| **3232** | 1122 | 142 | 37.92 |
| **3232** | 1123 | 201 | 8.81 |
| **3232** | 1212 | 178 | 16.30 |
| **3232** | 1213 | 193 | 12.42 |
| **3232** | 1222 | 142 | 41.72 |
| **3232** | 1223 | 188 | 17.30 |
| **3232** | 3112 | 173 | 24.52 |
| **3232** | 3113 | 201 | 13.33 |
| **3232** | 3122 | 123 | 47.49 |
| **3232** | 3123 | 174 | 19.75 |
| **3232** | 3212 | 162 | 25.12 |
| **3232** | 3213 | 190 | 12.55 |
| **3232** | 3222 | 116 | 54.89 |
| **3232** | 3223 | 143 | 37.86 |
| **3232** | 1112 | 189 | 16.53 |
| **3232** | 2113 | 198 | 9.97 |
| **3232** | 2122 | 143 | 36.05 |
| **3232** | 2123 | 197 | 8.59 |
| **3232** | 2212 | 181 | 18.43 |
| **3232** | 2213 | 199 | 8.09 |
| **3232** | 2222 | 148 | 32.94 |
| **3232** | 2223 | 187 | 14.09 |
| **3232** | 2112 | 187 | 15.91 |
| **3232** | 1121 | 164 | 25.88 |

| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3232** | 1211 | 196 | 13.42 |
| **3232** | 1221 | 187 | 13.55 |
| **3232** | 2111 | 197 | 12.95 |
| **3232** | 2121 | 173 | 21.97 |
| **3232** | 2211 | 187 | 14.34 |
| **3232** | 2221 | 186 | 13.81 |
| **3232** | 3111 | 188 | 16.28 |
| **3232** | 3121 | 149 | 33.23 |
| **3232** | 3211 | 185 | 14.50 |
| **3232** | 3221 | 136 | 34.00 |
| **3232** | 1111 | 195 | 12.07 |
| **3232** | 1131 | 148 | 31.67 |
| **3232** | 1132 | 125 | 45.15 |
| **3232** | 1133 | 193 | 11.13 |
| **3232** | 1231 | 152 | 29.09 |
| **3232** | 1232 | 101 | 66.26 |
| **3232** | 1233 | 184 | 15.51 |
| **3232** | 2131 | 143 | 37.87 |
| **3232** | 2132 | 133 | 39.53 |
| **3232** | 2133 | 195 | 8.34 |
| **3232** | 2231 | 148 | 38.19 |
| **3232** | 2232 | 106 | 60.50 |
| **3232** | 2233 | 187 | 16.56 |
| **3232** | 3131 | 128 | 42.22 |
| **3232** | 3132 | 62 | 79.71 |
| **3232** | 3133 | 174 | 25.26 |
| **3232** | 3231 | 109 | 54.99 |
| **3233** | 1113 | 175 | 16.74 |
| **3233** | 1122 | 177 | 22.90 |

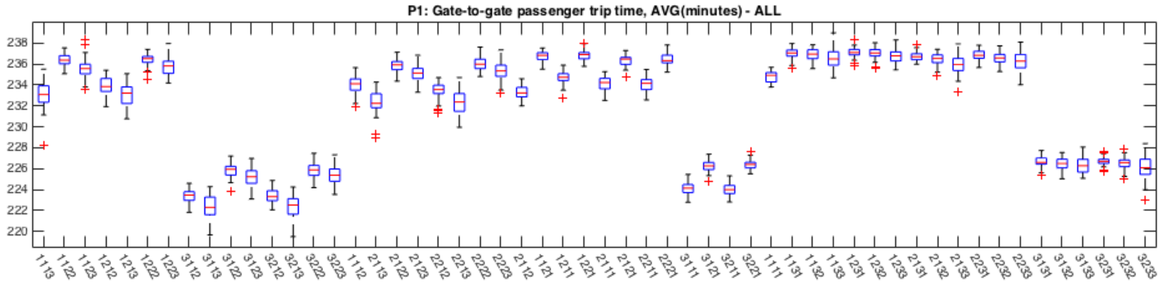
| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3233** | 1123 | 139 | 32.96 |
| **3233** | 1212 | 210 | 7.21 |
| **3233** | 1213 | 184 | 17.74 |
| **3233** | 1222 | 191 | 15.74 |
| **3233** | 1223 | 132 | 38.57 |
| **3233** | 3112 | 207 | 8.06 |
| **3233** | 3113 | 167 | 24.53 |
| **3233** | 3122 | 143 | 34.21 |
| **3233** | 3123 | 118 | 50.40 |
| **3233** | 3212 | 199 | 11.05 |
| **3233** | 3213 | 157 | 27.78 |
| **3233** | 3222 | 166 | 24.72 |
| **3233** | 3223 | 100 | 60.48 |
| **3233** | 1112 | 206 | 7.47 |
| **3233** | 2113 | 176 | 17.95 |
| **3233** | 2122 | 171 | 25.56 |
| **3233** | 2123 | 145 | 40.87 |
| **3233** | 2212 | 206 | 5.95 |
| **3233** | 2213 | 172 | 19.16 |
| **3233** | 2222 | 189 | 14.69 |
| **3233** | 2223 | 130 | 51.27 |
| **3233** | 2112 | 205 | 9.25 |
| **3233** | 1121 | 186 | 15.95 |
| **3233** | 1211 | 210 | 8.23 |
| **3233** | 1221 | 196 | 7.66 |
| **3233** | 2111 | 211 | 5.83 |
| **3233** | 2121 | 189 | 13.55 |
| **3233** | 2211 | 209 | 8.07 |
| **3233** | 2221 | 202 | 9.95 |

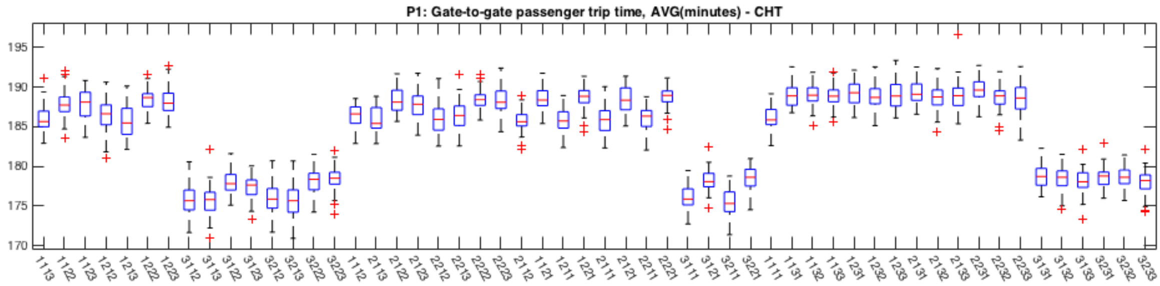
| SCENARIO A | SCENARIO B | DIFF METRICS | SCORE |
|---|---|---|---|
| **3233** | 3111 | 205 | 9.85 |
| **3233** | 3121 | 157 | 29.25 |
| **3233** | 3211 | 200 | 11.69 |
| **3233** | 3221 | 172 | 21.26 |
| **3233** | 1111 | 210 | 7.33 |
| **3233** | 1131 | 173 | 23.56 |
| **3233** | 1132 | 169 | 24.98 |
| **3233** | 1133 | 132 | 38.49 |
| **3233** | 1231 | 192 | 12.41 |
| **3233** | 1232 | 182 | 18.60 |
| **3233** | 1233 | 97 | 55.68 |
| **3233** | 2131 | 178 | 25.04 |
| **3233** | 2132 | 160 | 30.26 |
| **3233** | 2133 | 116 | 44.21 |
| **3233** | 2231 | 185 | 16.15 |
| **3233** | 2232 | 168 | 23.69 |
| **3233** | 2233 | 105 | 54.27 |
| **3233** | 3131 | 149 | 29.86 |
| **3233** | 3132 | 142 | 40.89 |
| **3233** | 3133 | 72 | 78.65 |
| **3233** | 3231 | 174 | 16.60 |
| **3233** | 3232 | 155 | 29.29 |

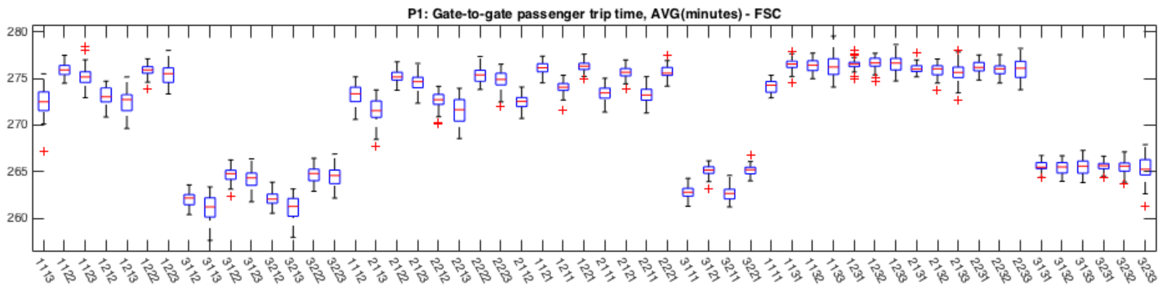
# Appendix F Simulation results

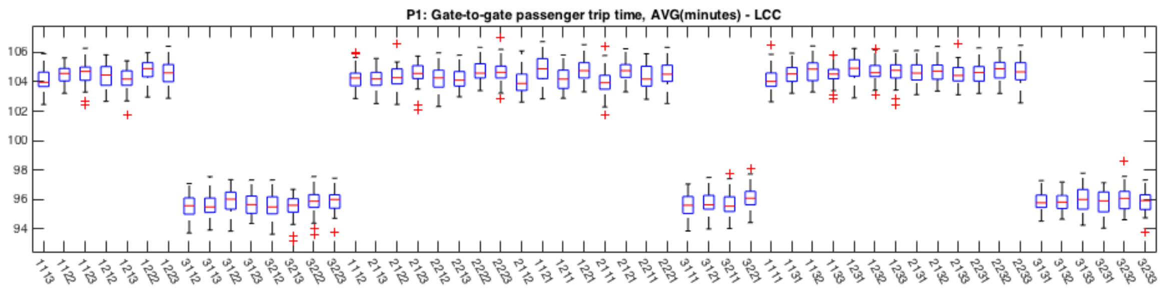
This section contains plot box for all metrics and scenario combinations. Numeric tables have been used for the analysis instead, but since the total number of outputs surpasses the million this section only shows plots of the values rather than the values themselves.

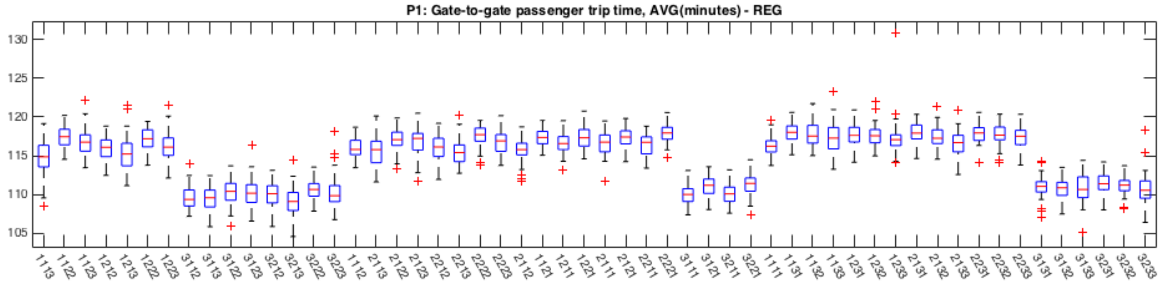
The main box contains 50% of the central values, the red line inside the main box is the median, up and lower limits are the 25% and 75% percentiles respectively and outliers are represented as red crosses outside the limits.

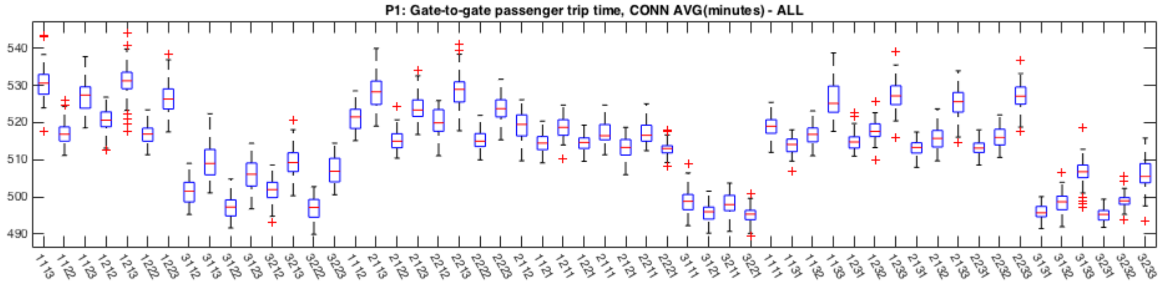


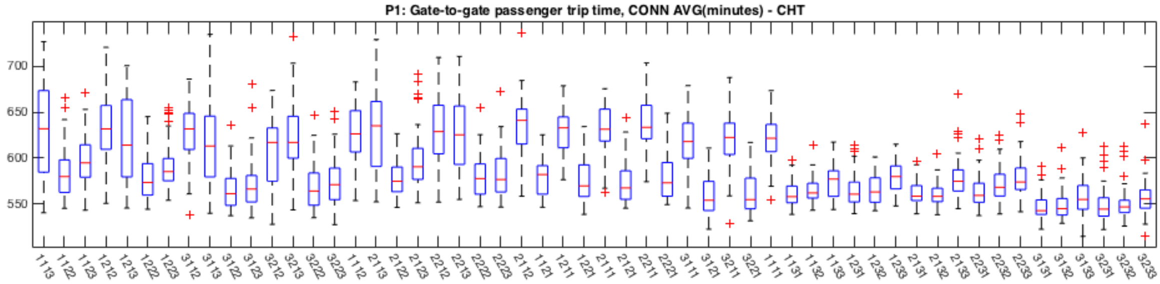



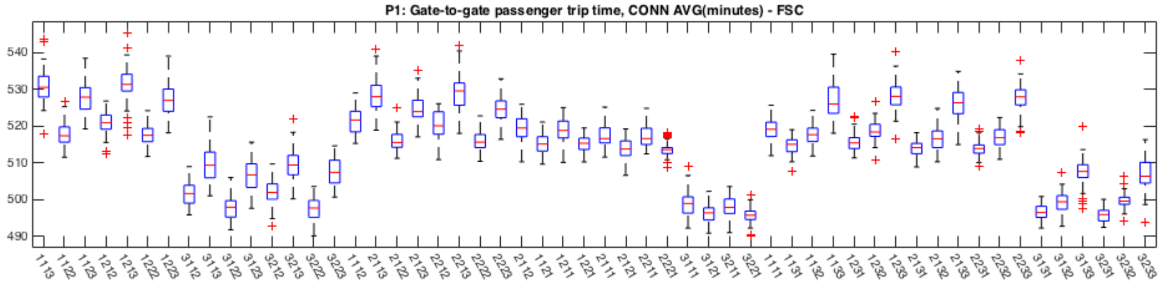



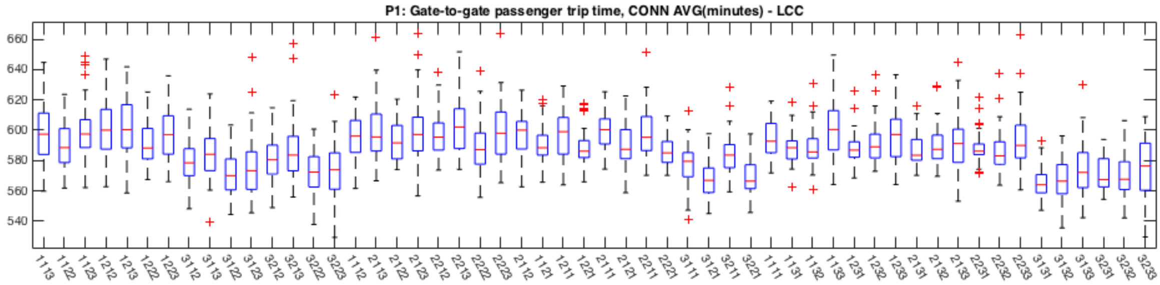



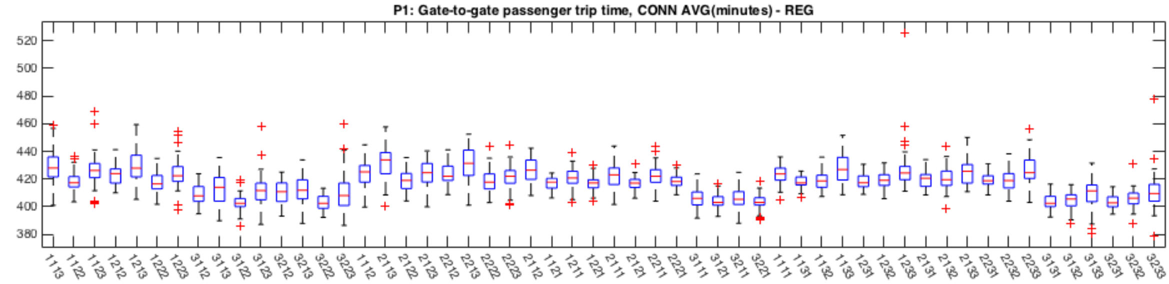

P1: Gate-to-gate passenger trip time, AVG(minutes) - REG
130
125
120
115
110
105

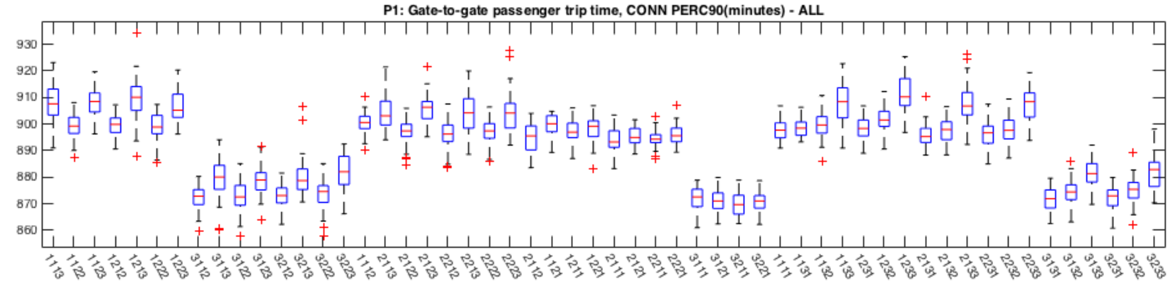

P1: Gate-to-gate passenger trip time, CONN AVG(minutes) - ALL
540
530
520
510
500
490

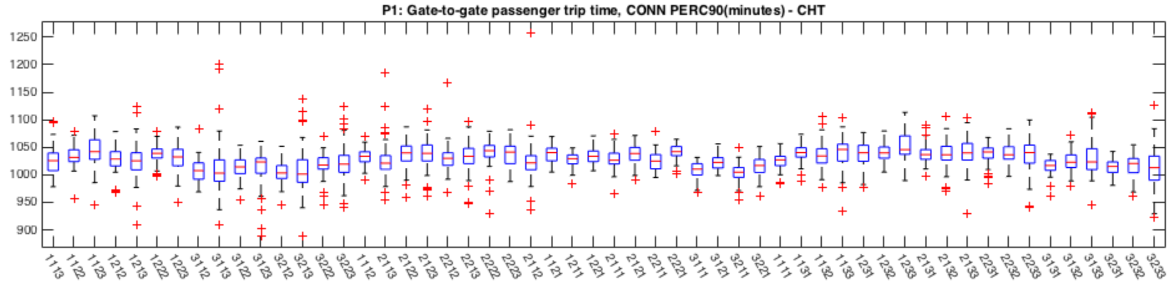

P1: Gate-to-gate passenger trip time, CONN AVG(minutes) - CHT
700
650
600
550

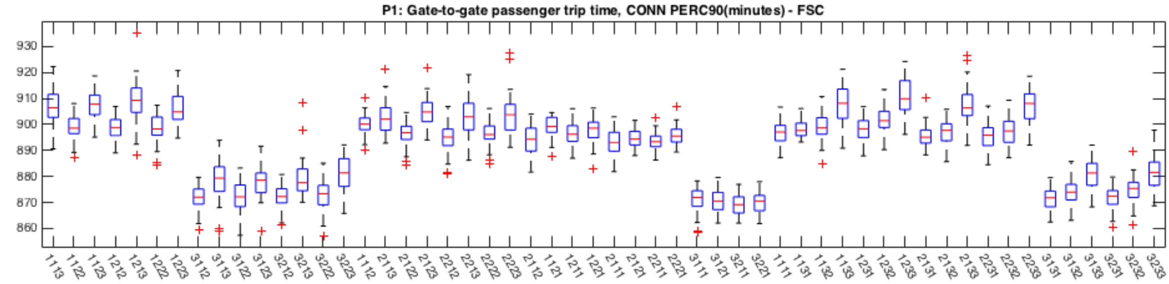

P1: Gate-to-gate passenger trip time, CONN AVG(minutes) - FSC
540
530
520
510
500
490

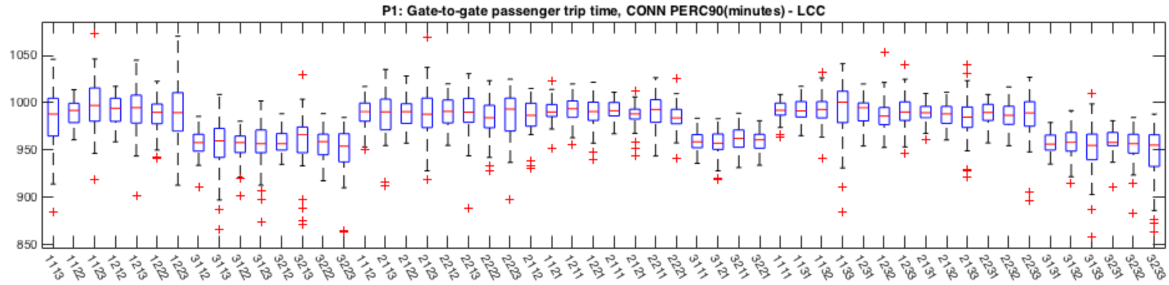

P1: Gate-to-gate passenger trip time, CONN AVG(minutes) - LCC
660
640
620
600
580
560
540


P1: Gate-to-gate passenger trip time, CONN AVG(minutes) - REG
520
500
480
460
440
420
400
380

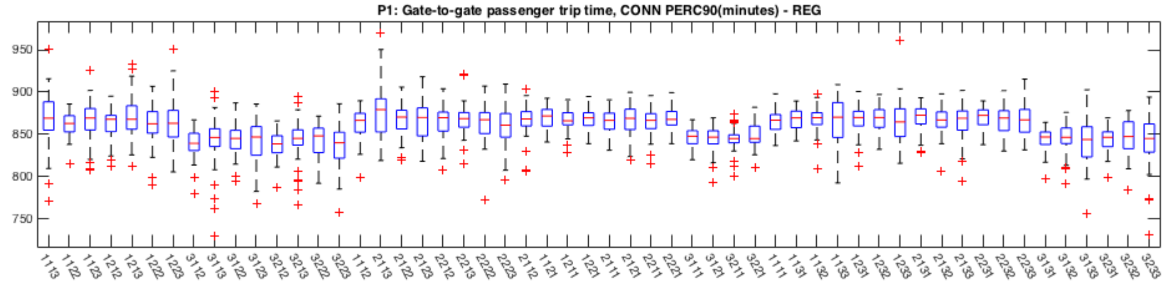

P1: Gate-to-gate passenger trip time, CONN PERC90(minutes) - ALL
930
920
910
900
890
880
870
860


P1: Gate-to-gate passenger trip time, CONN PERC90(minutes) - CHT
1250
1200
1150
1100
1050
1000
950
900

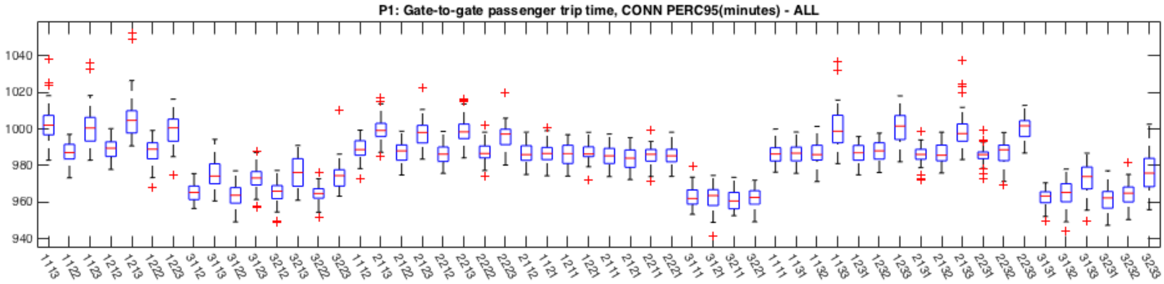

P1: Gate-to-gate passenger trip time, CONN PERC90(minutes) - FSC
930
920
910
900
890
880
870
860


P1: Gate-to-gate passenger trip time, CONN PERC90(minutes) - LCC
1050
1000
950
900
850

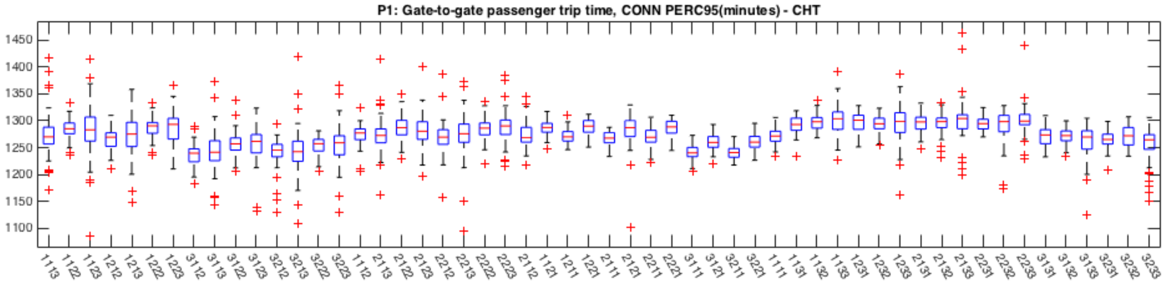
P1: Gate-to-gate passenger trip time, CONN PERC90(minutes) - REG



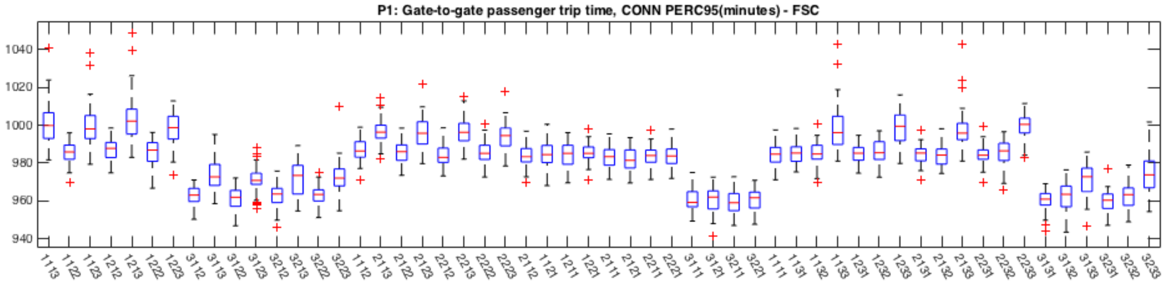
P1: Gate-to-gate passenger trip time, CONN PERC95(minutes) - ALL



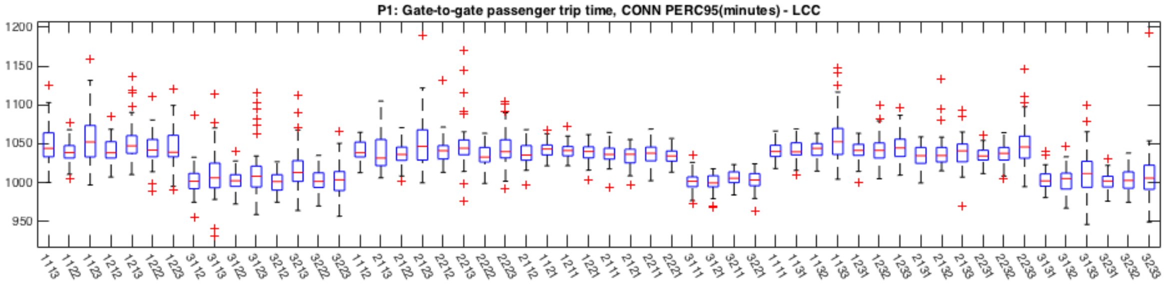
P1: Gate-to-gate passenger trip time, CONN PERC95(minutes) - CHT

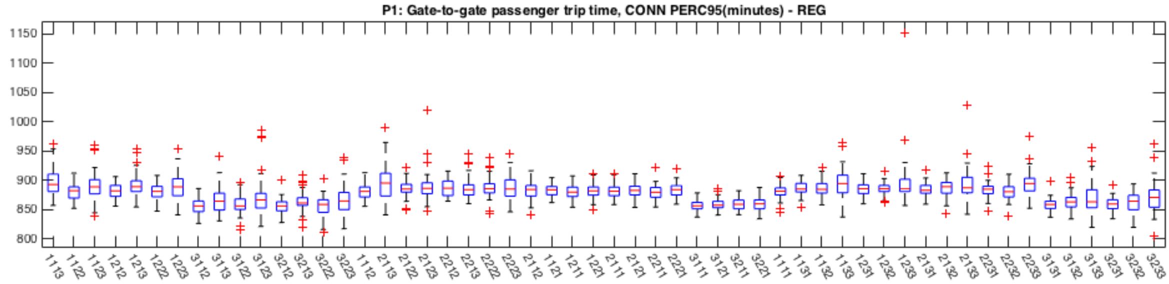


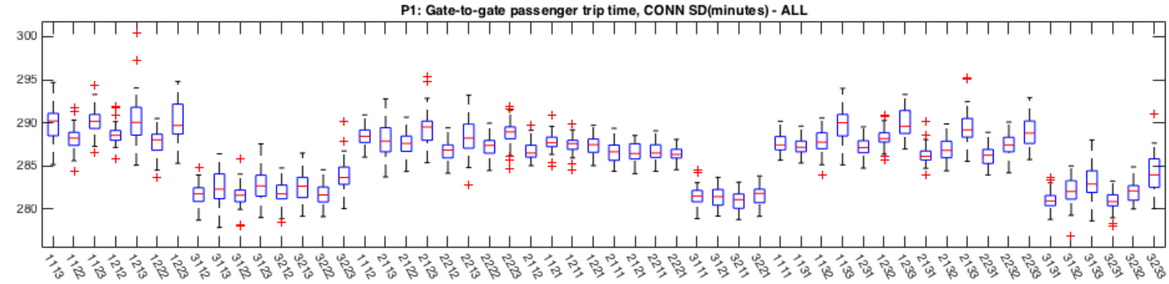
P1: Gate-to-gate passenger trip time, CONN PERC95(minutes) - FSC

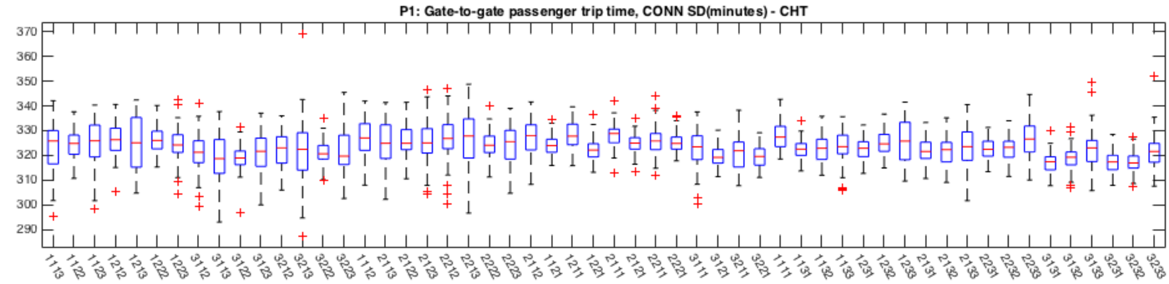


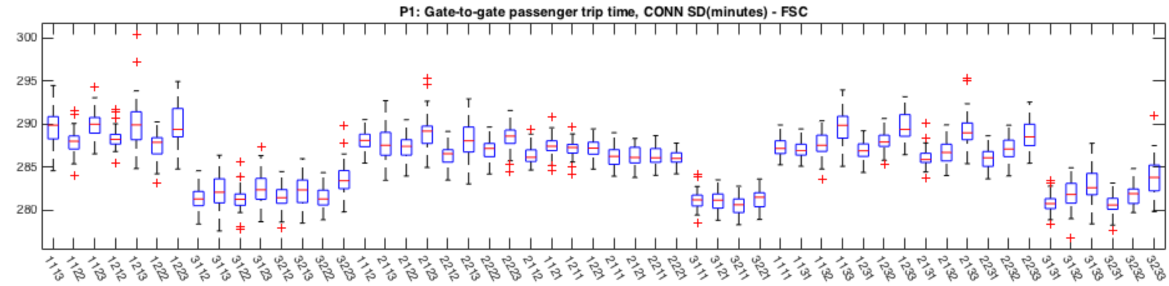
P1: Gate-to-gate passenger trip time, CONN PERC95(minutes) - LCC

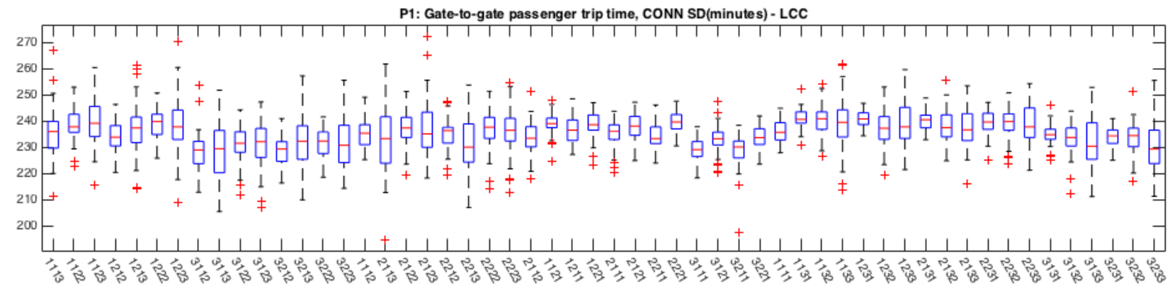


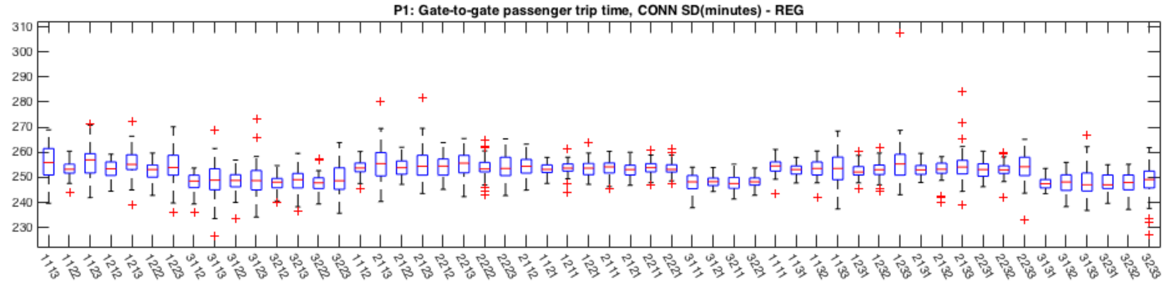

P1: Gate-to-gate passenger trip time, CONN PERC95(minutes) - REG

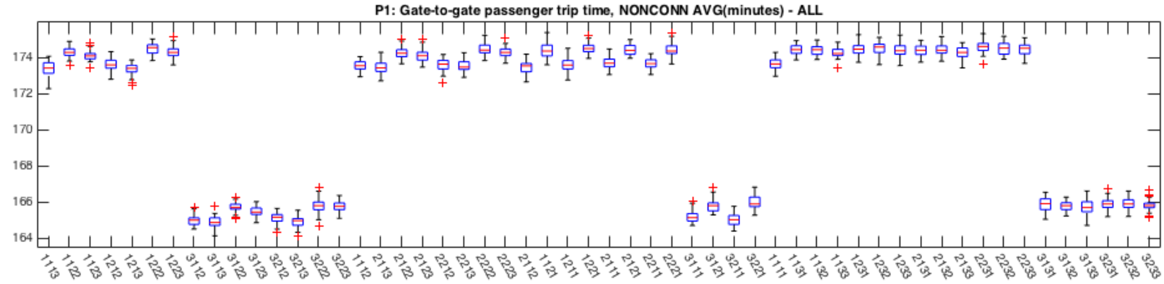

P1: Gate-to-gate passenger trip time, CONN SD(minutes) - ALL

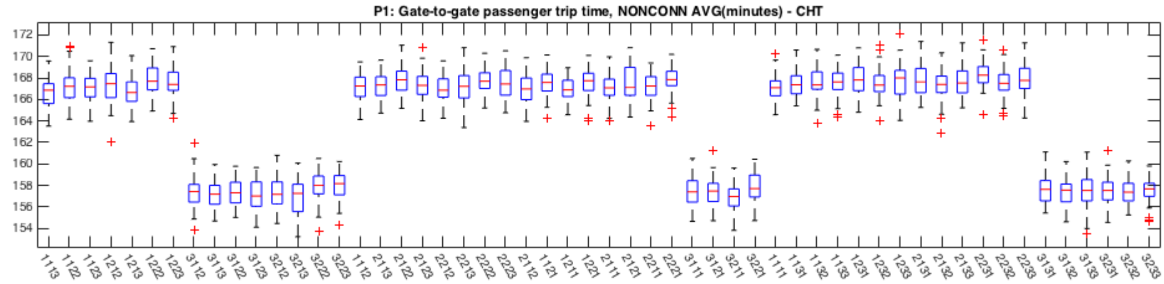

P1: Gate-to-gate passenger trip time, CONN SD(minutes) - CHT

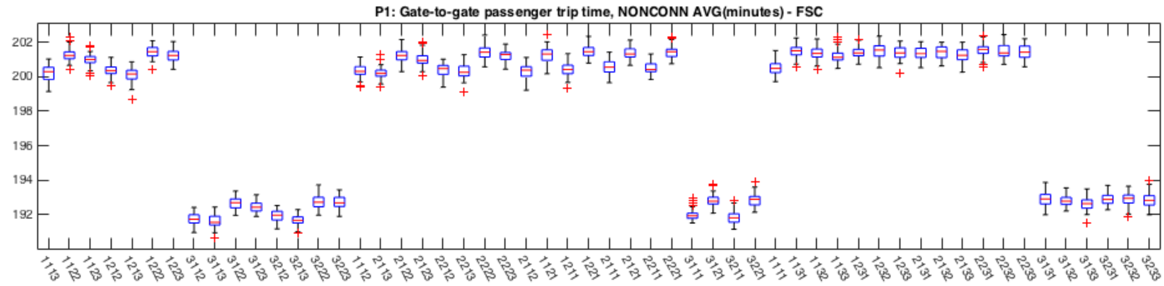

P1: Gate-to-gate passenger trip time, CONN SD(minutes) - FSC

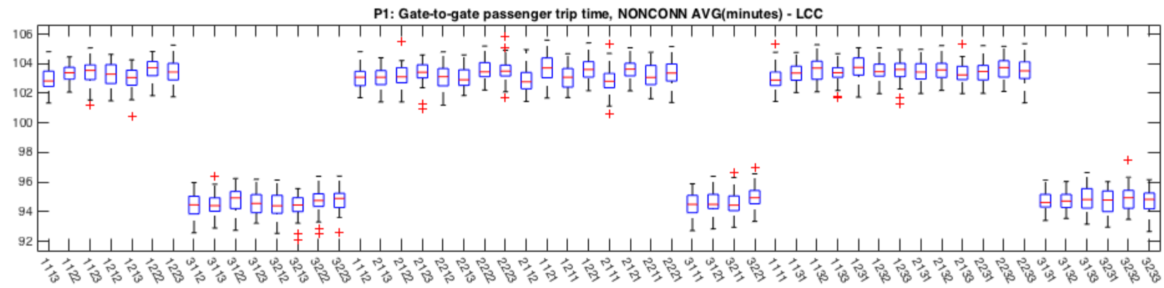

P1: Gate-to-gate passenger trip time, CONN SD(minutes) - LCC

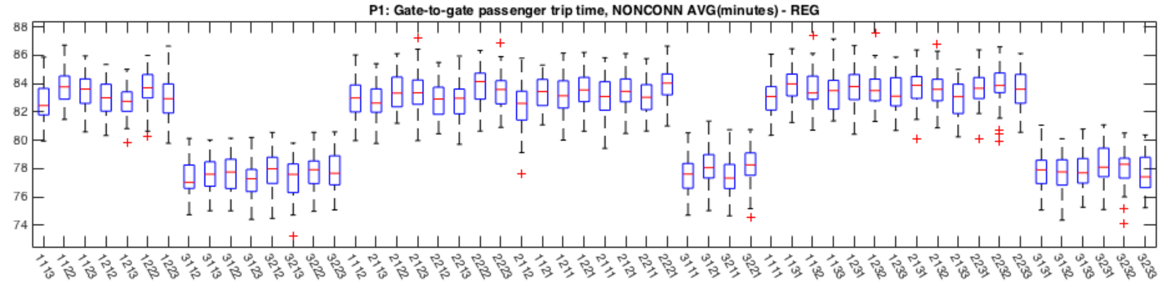

P1: Gate-to-gate passenger trip time, CONN SD(minutes) - REG

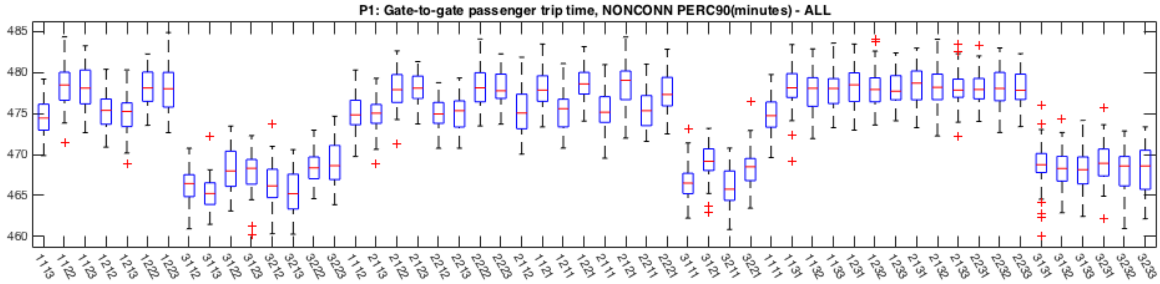

P1: Gate-to-gate passenger trip time, NONCONN AVG(minutes) - ALL

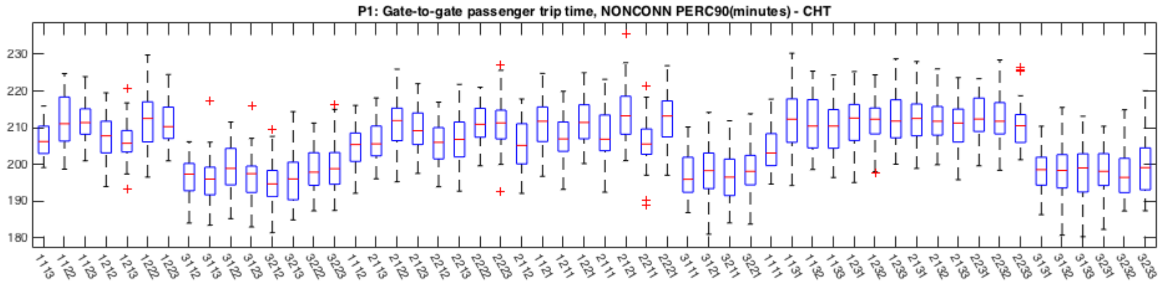

P1: Gate-to-gate passenger trip time, NONCONN AVG(minutes) - CHT

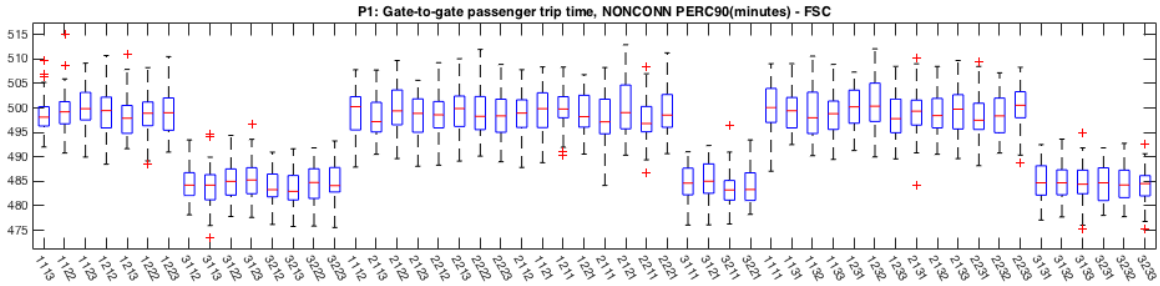

P1: Gate-to-gate passenger trip time, NONCONN AVG(minutes) - FSC

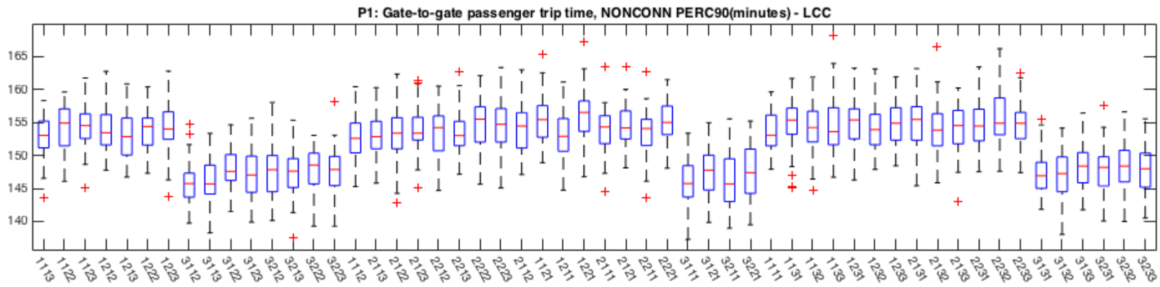

P1: Gate-to-gate passenger trip time, NONCONN AVG(minutes) - LCC

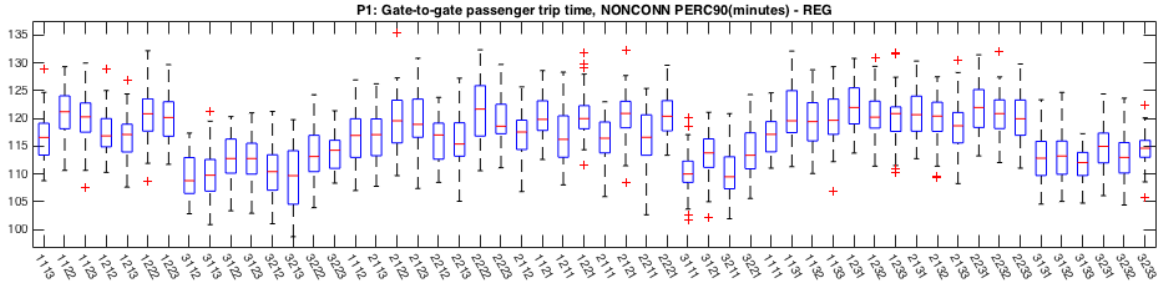

P1: Gate-to-gate passenger trip time, NONCONN AVG(minutes) - REG

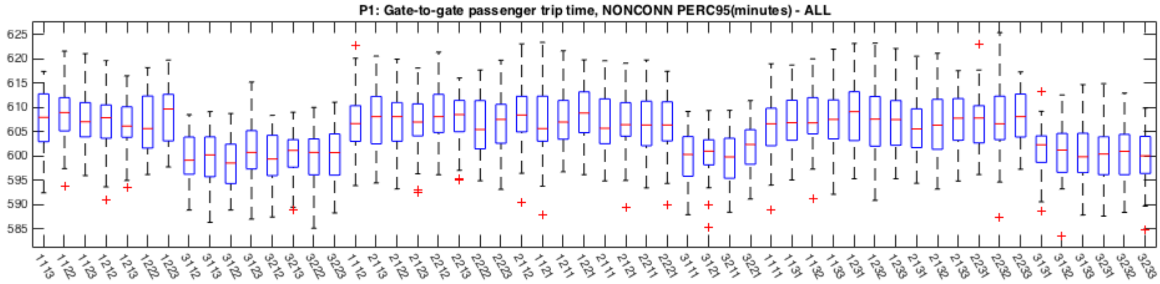

P1: Gate-to-gate passenger trip time, NONCONN PERC90(minutes) - ALL

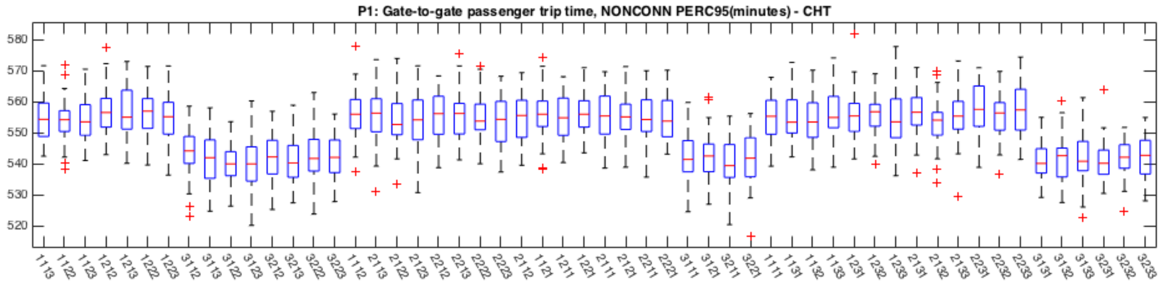

P1: Gate-to-gate passenger trip time, NONCONN PERC90(minutes) - CHT

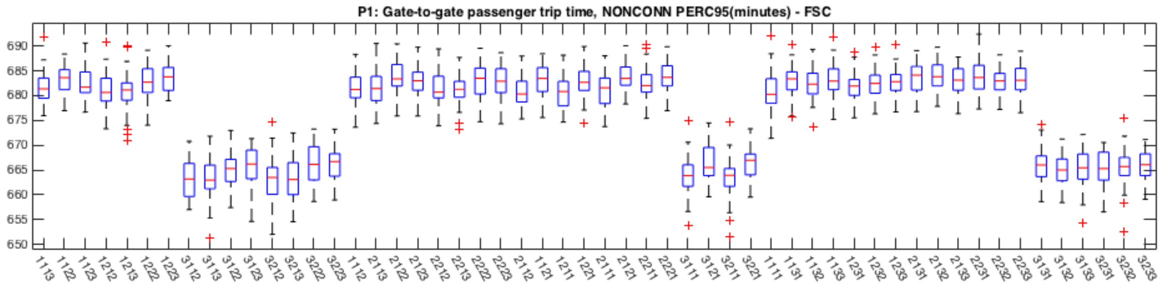

P1: Gate-to-gate passenger trip time, NONCONN PERC90(minutes) - FSC

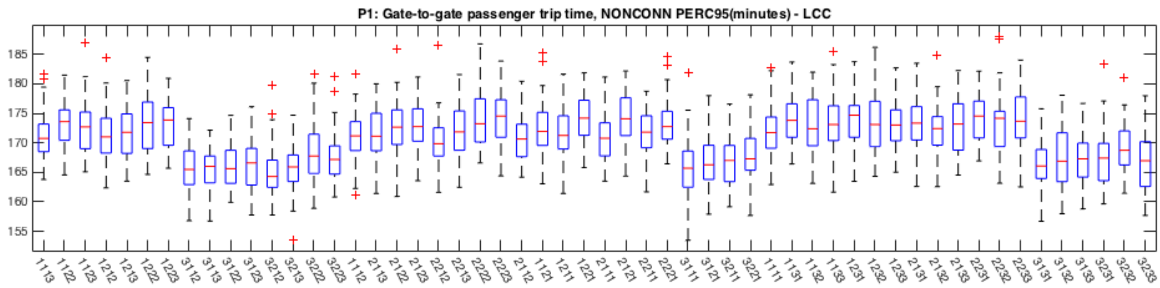

P1: Gate-to-gate passenger trip time, NONCONN PERC90(minutes) - LCC


P1: Gate-to-gate passenger trip time, NONCONN PERC90(minutes) - REG

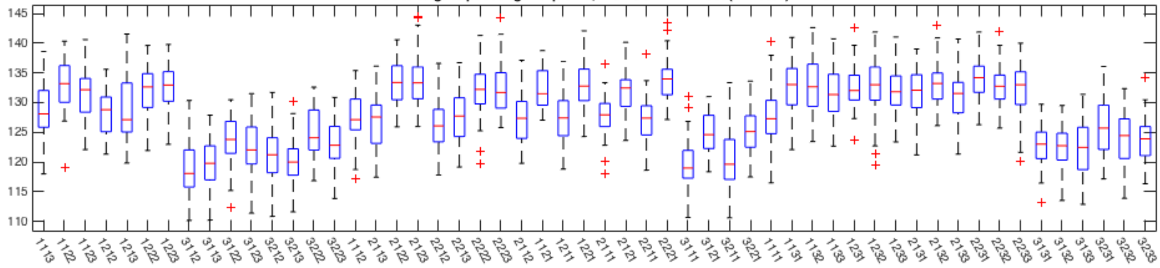

P1: Gate-to-gate passenger trip time, NONCONN PERC95(minutes) - ALL


P1: Gate-to-gate passenger trip time, NONCONN PERC95(minutes) - CHT

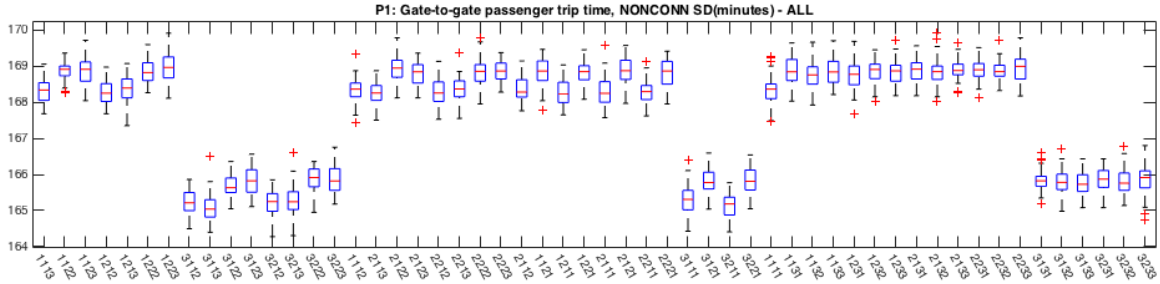

P1: Gate-to-gate passenger trip time, NONCONN PERC95(minutes) - FSC


P1: Gate-to-gate passenger trip time, NONCONN PERC95(minutes) - LCC

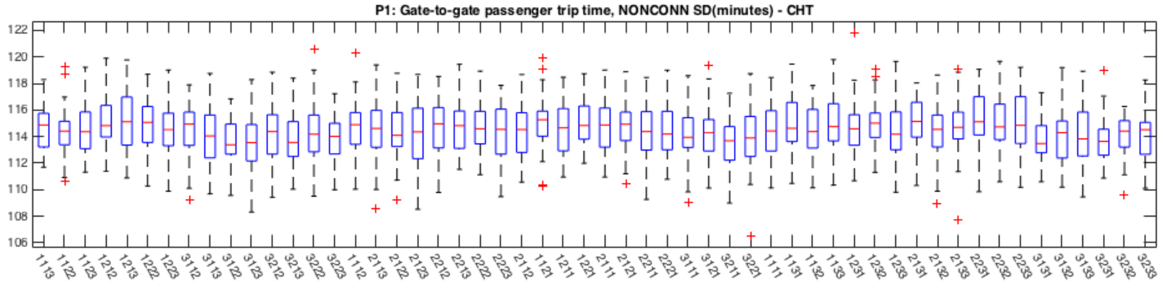
P1: Gate-to-gate passenger trip time, NONCONN PERC95(minutes) - REG



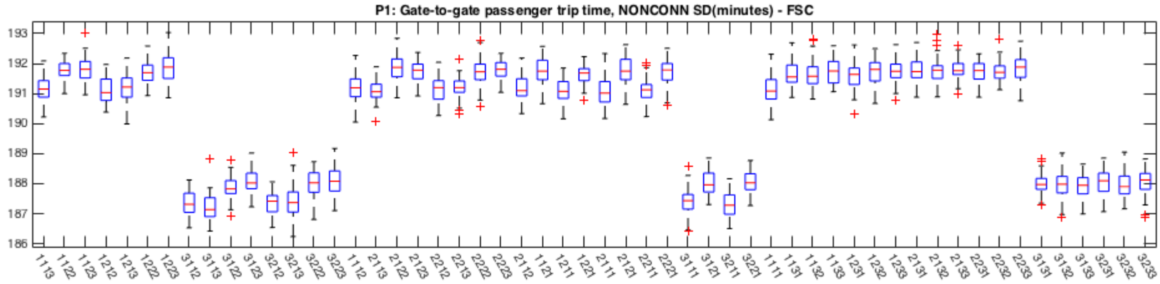
P1: Gate-to-gate passenger trip time, NONCONN SD(minutes) - ALL



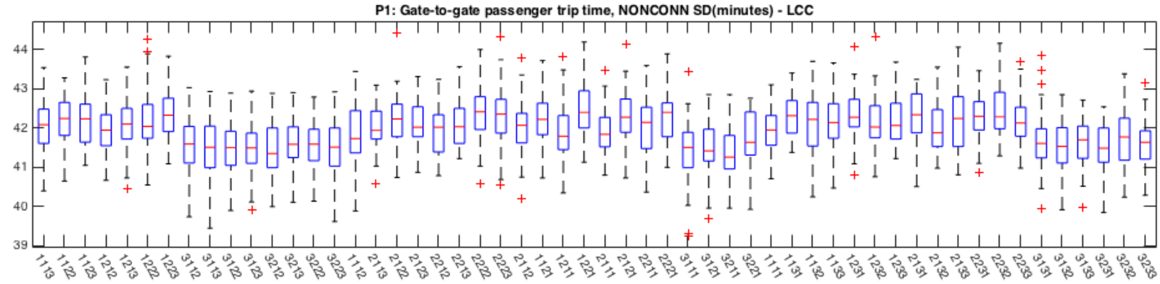
P1: Gate-to-gate passenger trip time, NONCONN SD(minutes) - CHT

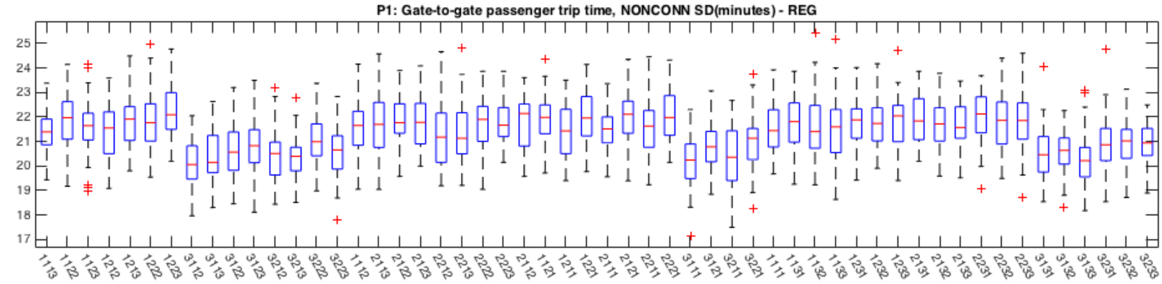


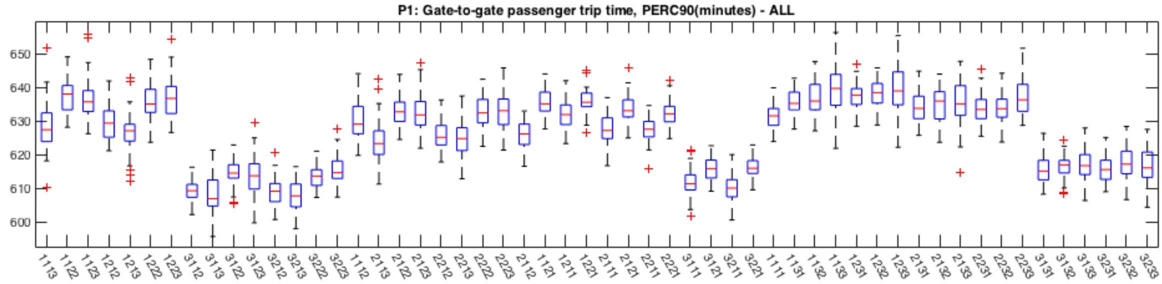
P1: Gate-to-gate passenger trip time, NONCONN SD(minutes) - FSC

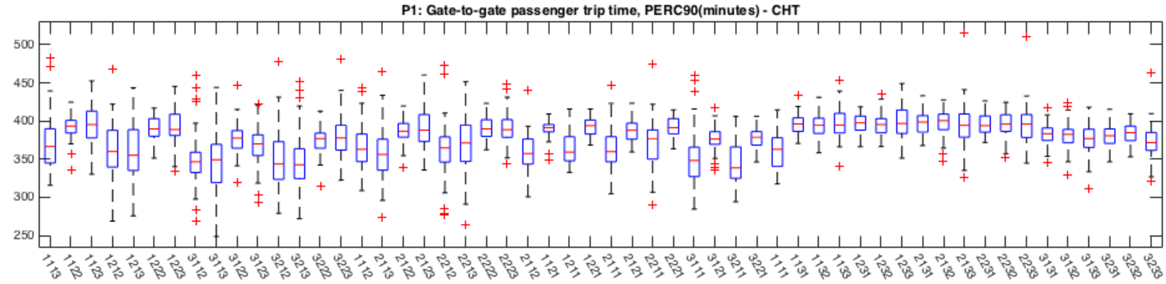


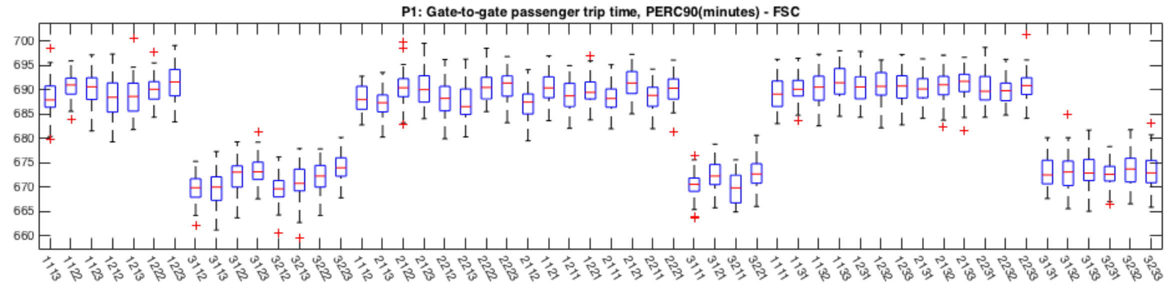
P1: Gate-to-gate passenger trip time, NONCONN SD(minutes) - LCC

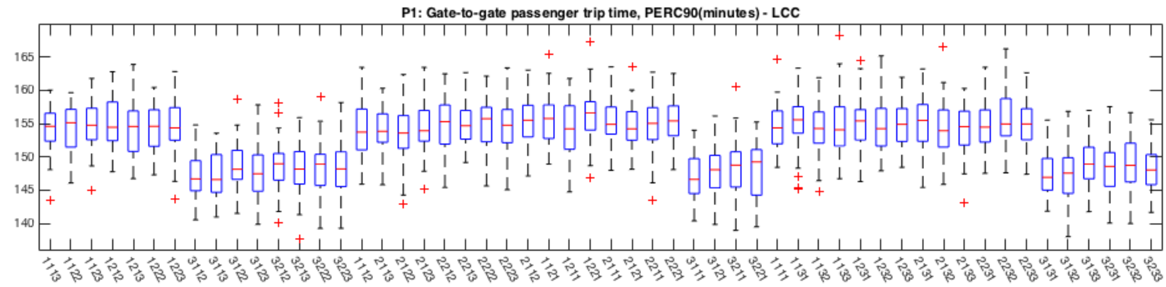


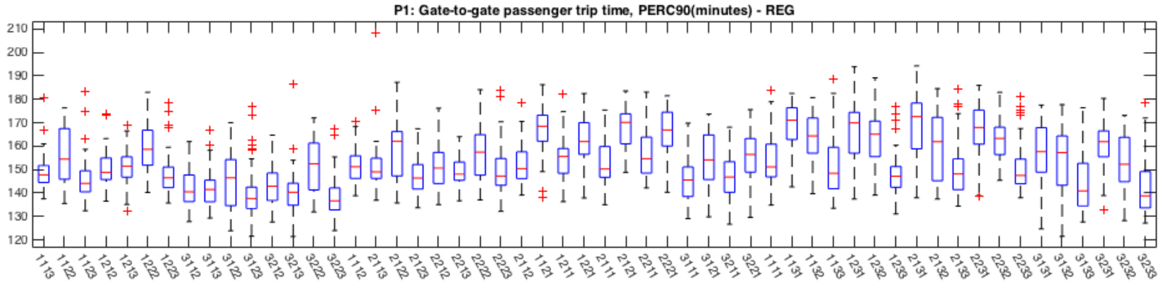

P1: Gate-to-gate passenger trip time, NONCONN SD(minutes) - REG

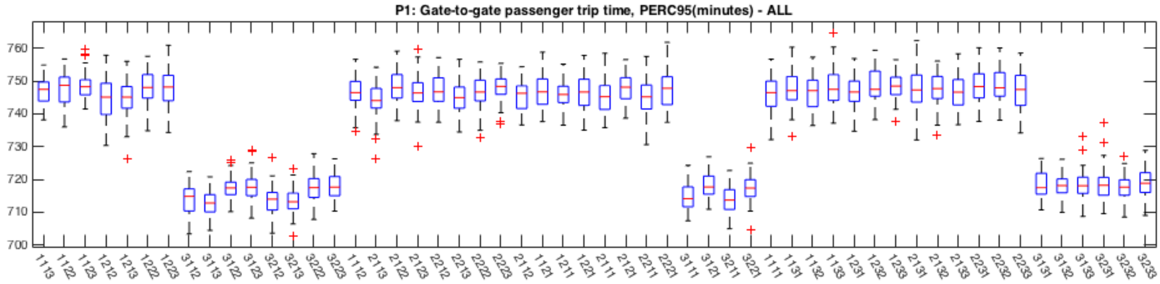

P1: Gate-to-gate passenger trip time, PERC90(minutes) - ALL

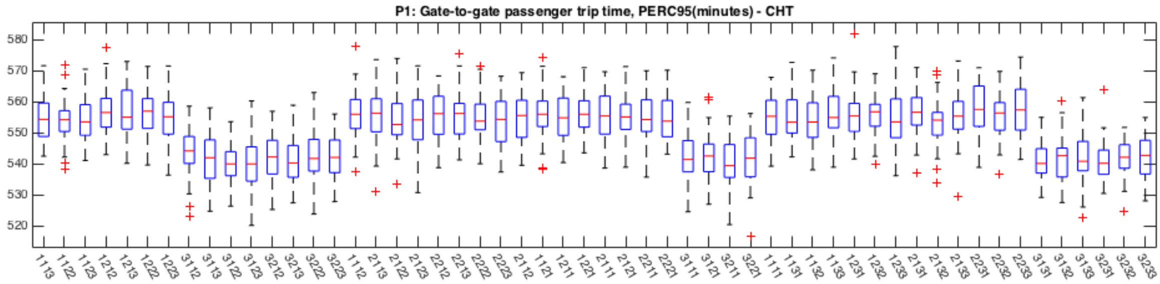

P1: Gate-to-gate passenger trip time, PERC90(minutes) - CHT

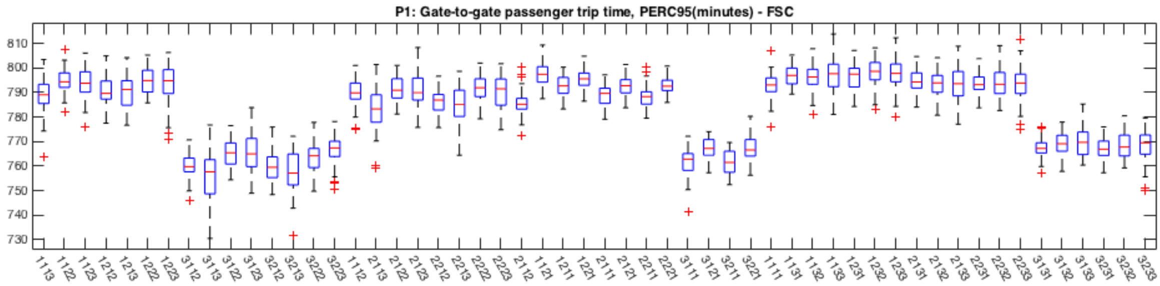

P1: Gate-to-gate passenger trip time, PERC90(minutes) - FSC

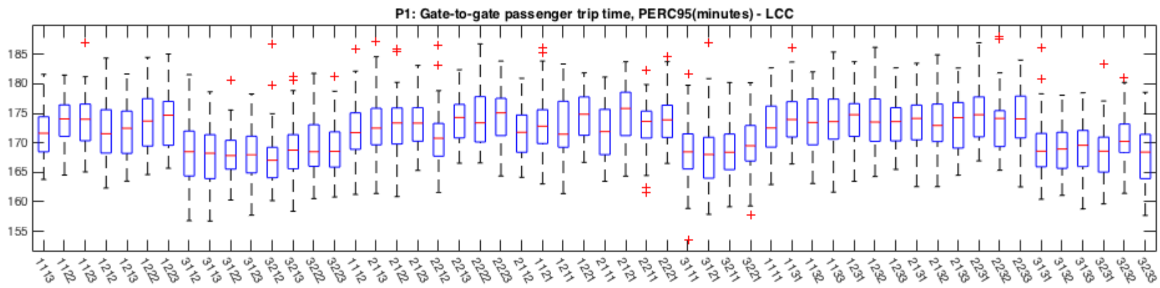

P1: Gate-to-gate passenger trip time, PERC90(minutes) - LCC

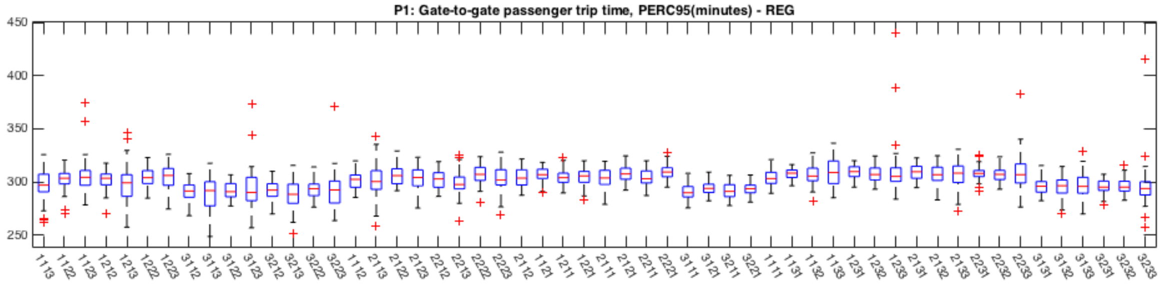

P1: Gate-to-gate passenger trip time, PERC90(minutes) - REG

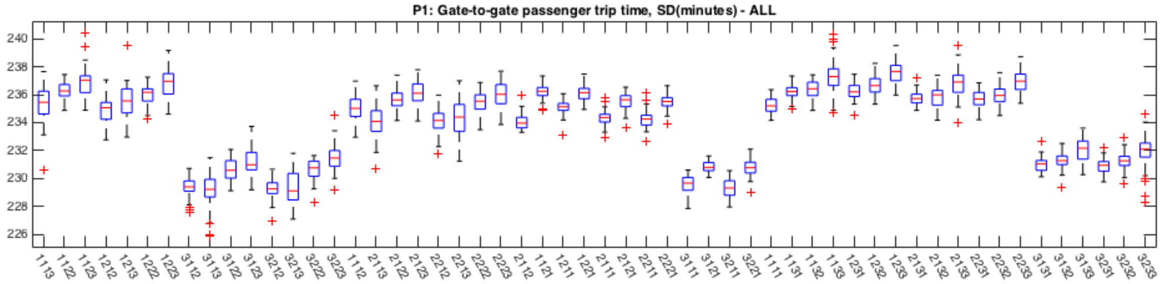

P1: Gate-to-gate passenger trip time, PERC95(minutes) - ALL

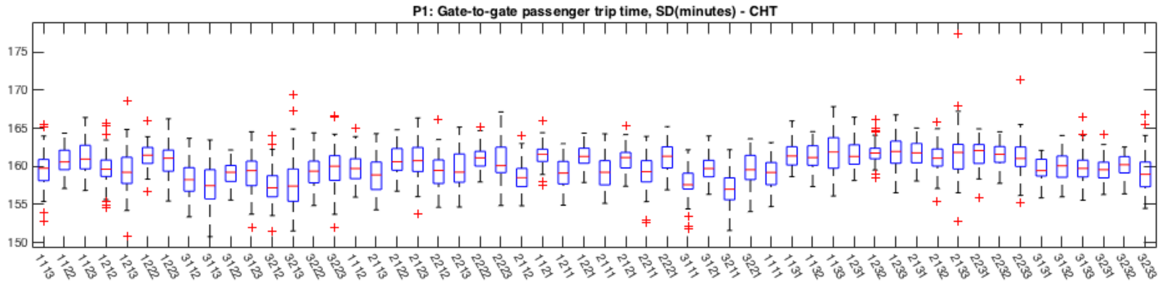

P1: Gate-to-gate passenger trip time, PERC95(minutes) - CHT

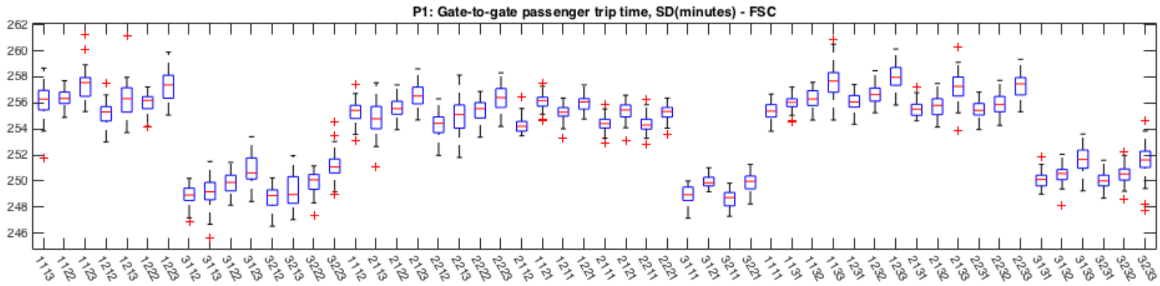

P1: Gate-to-gate passenger trip time, PERC95(minutes) - FSC

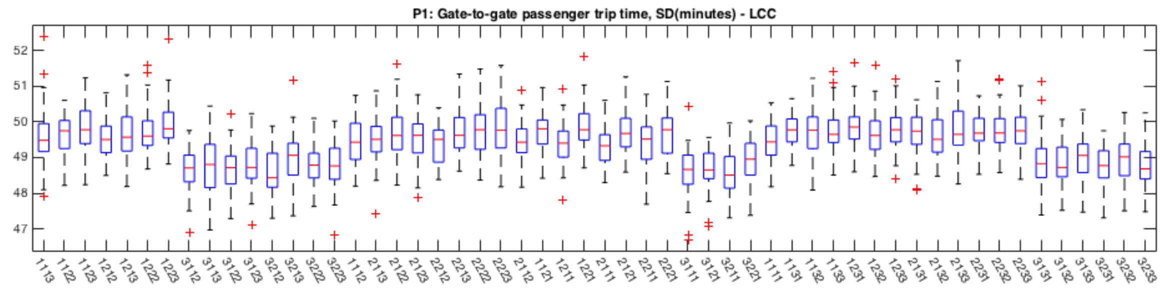

P1: Gate-to-gate passenger trip time, PERC95(minutes) - LCC

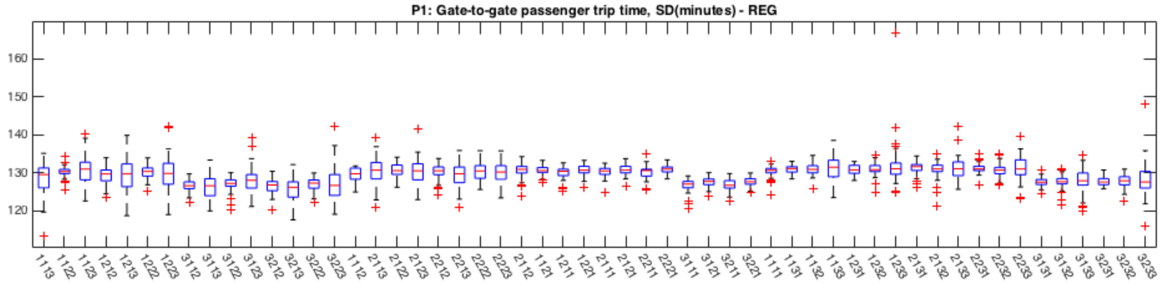

P1: Gate-to-gate passenger trip time, PERC95(minutes) - REG

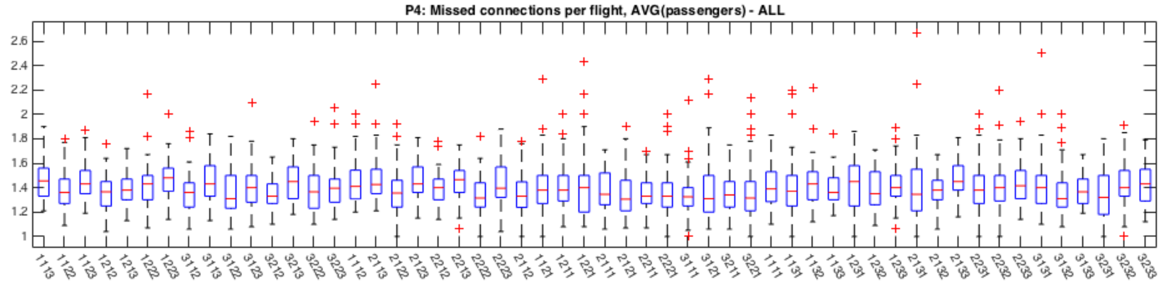

P1: Gate-to-gate passenger trip time, SD(minutes) - ALL

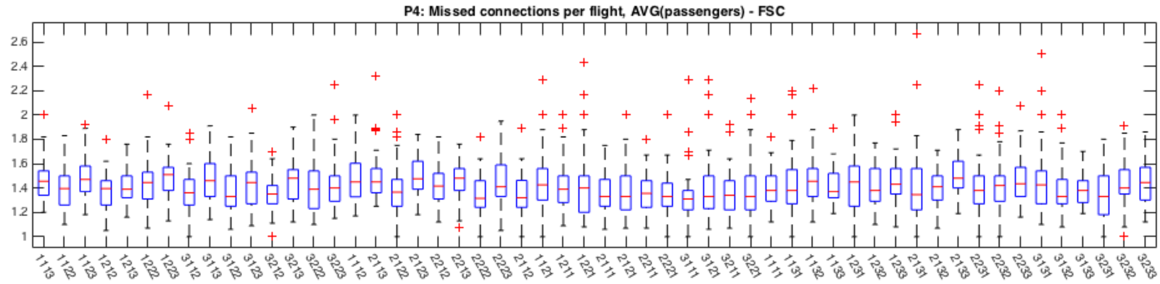

P1: Gate-to-gate passenger trip time, SD(minutes) - CHT

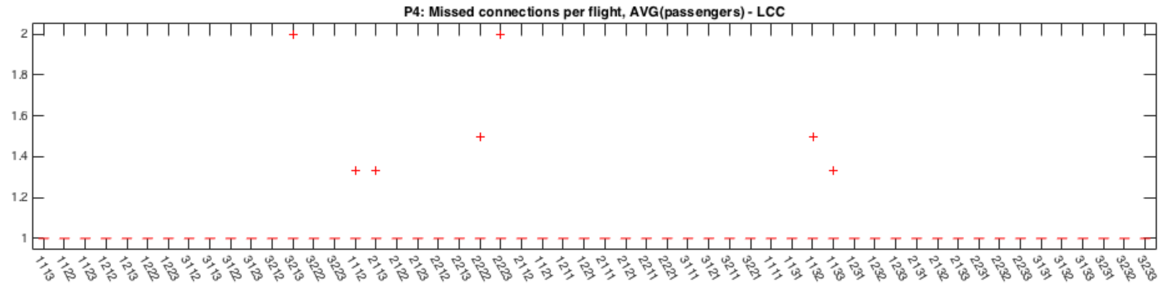

P1: Gate-to-gate passenger trip time, SD(minutes) - FSC

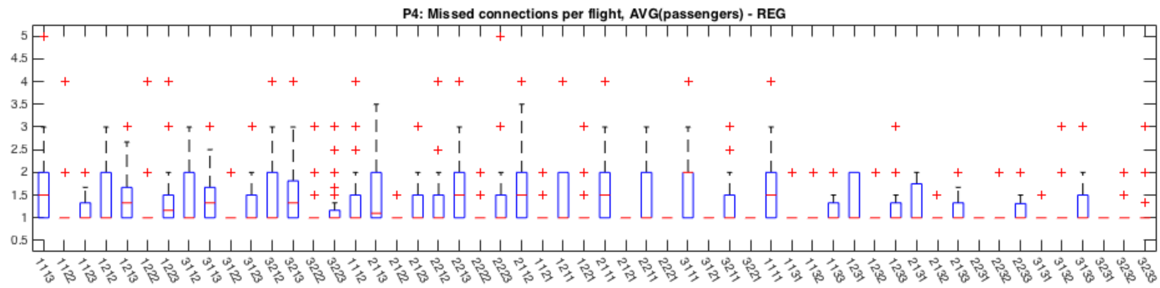

P1: Gate-to-gate passenger trip time, SD(minutes) - LCC

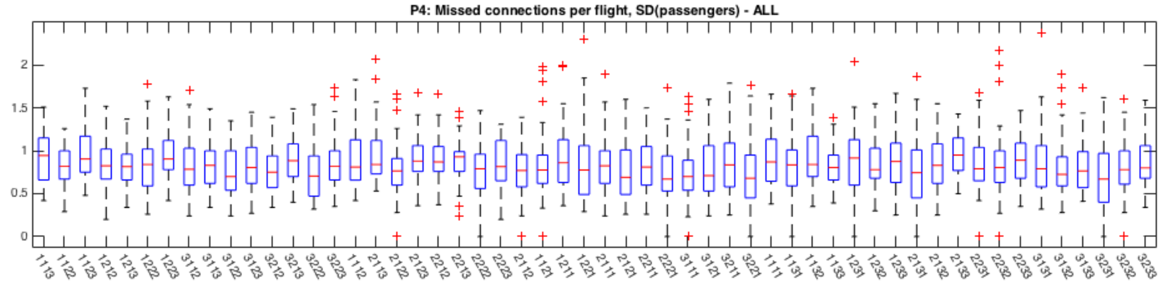

P1: Gate-to-gate passenger trip time, SD(minutes) - REG

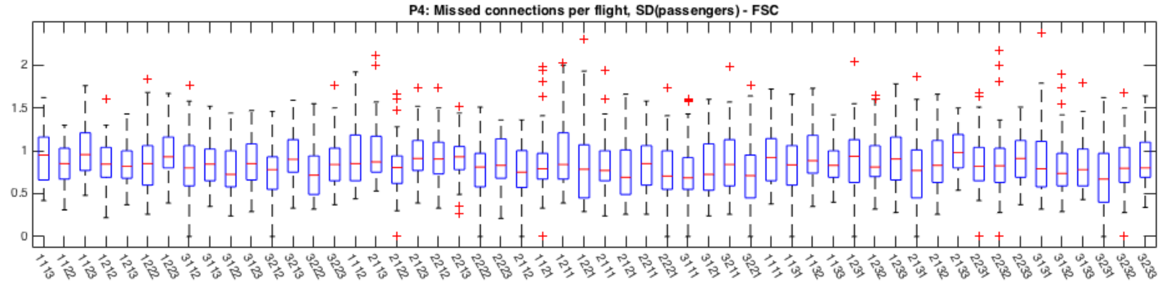

P4: Missed connections per flight, AVG(passengers) - ALL


P4: Missed connections per flight, AVG(passengers) - FSC


P4: Missed connections per flight, AVG(passengers) - LCC


P4: Missed connections per flight, AVG(passengers) - REG


P4: Missed connections per flight, SD(passengers) - ALL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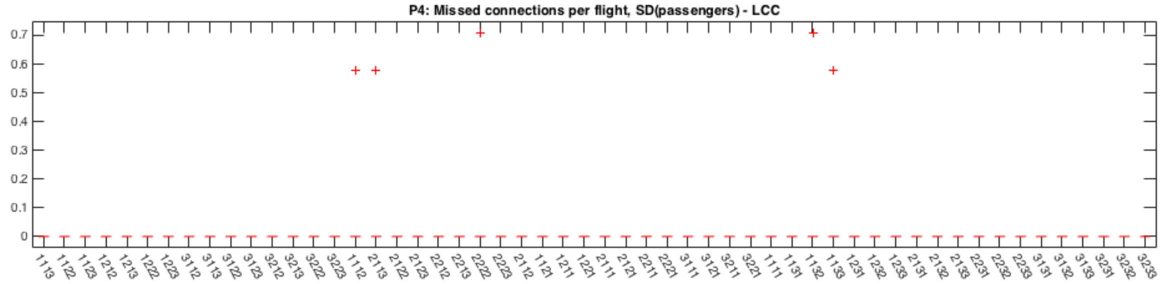
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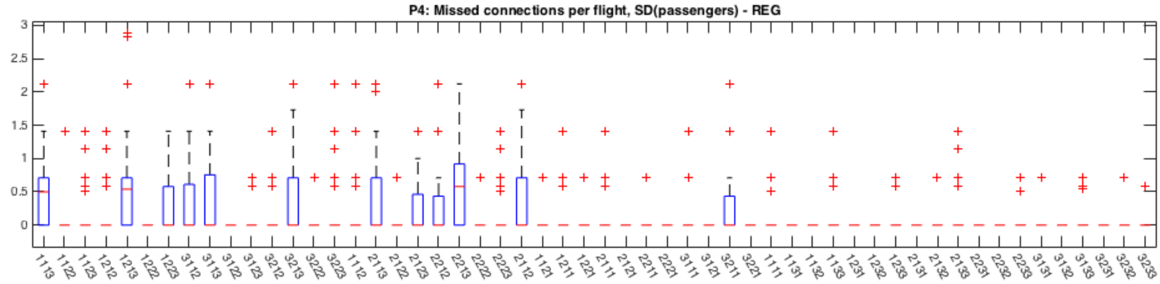
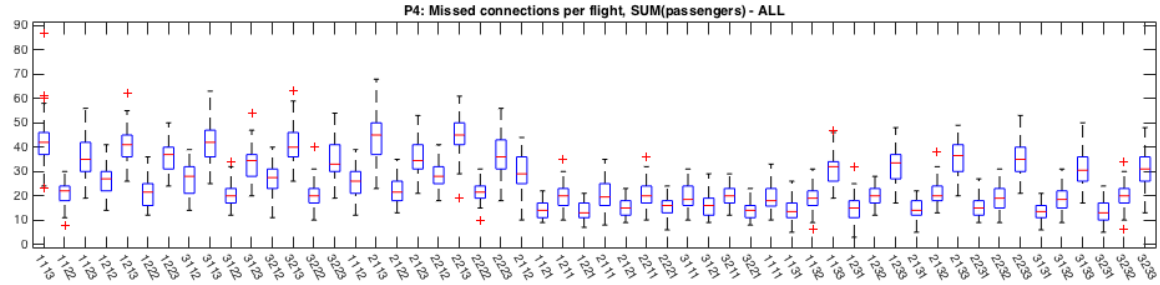
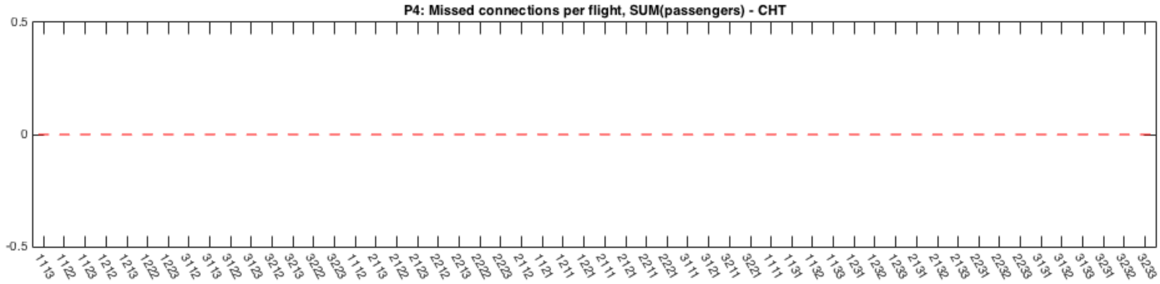
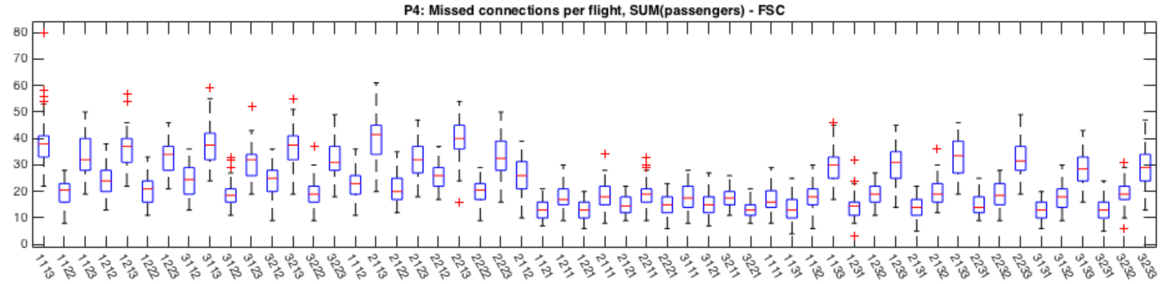
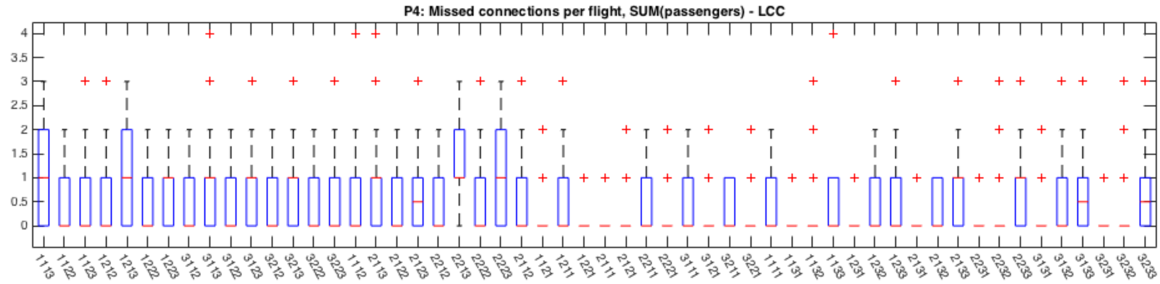
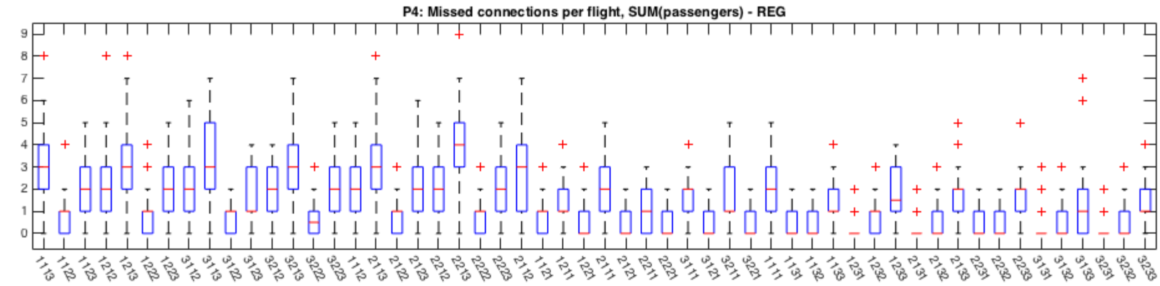

P4: Missed connections per flight, SD(passengers) - REG

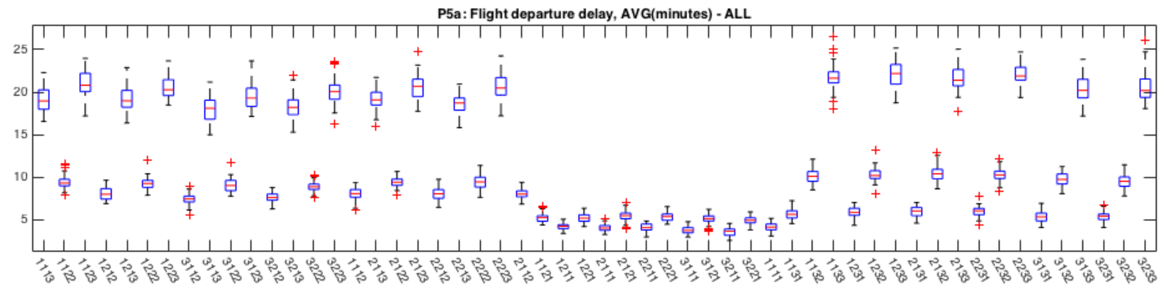

P4: Missed connections per flight, SUM(passengers) - ALL

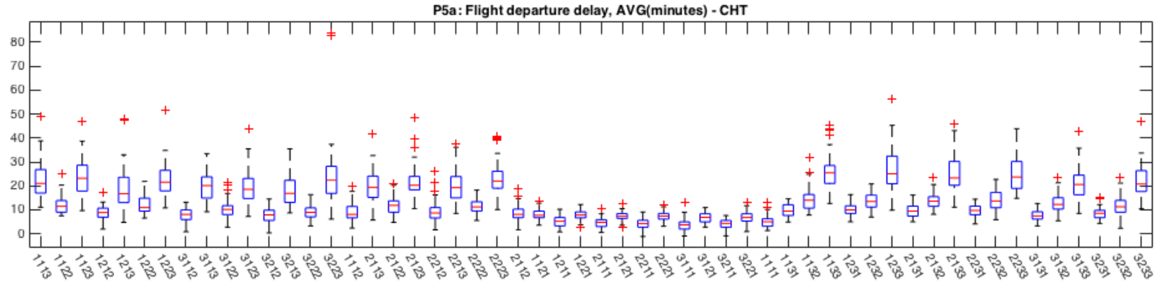

P4: Missed connections per flight, SUM(passengers) - CHT

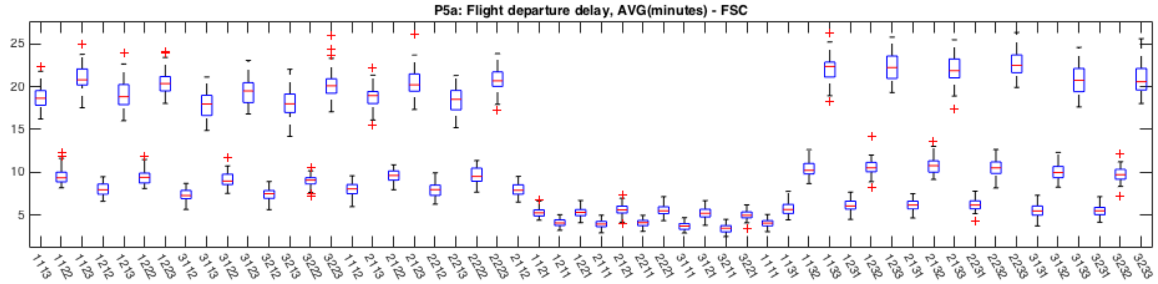

P4: Missed connections per flight, SUM(passengers) - FSC

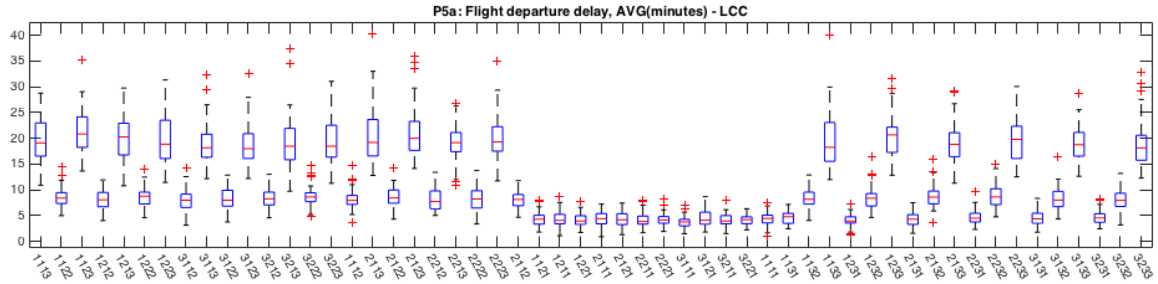

P4: Missed connections per flight, SUM(passengers) - LCC

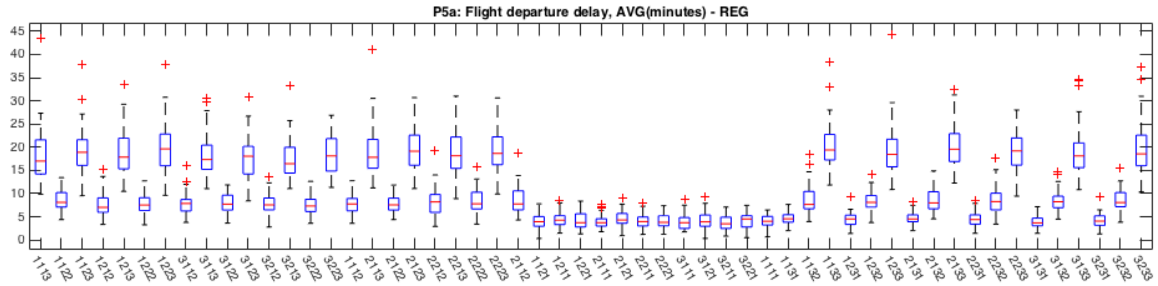

P4: Missed connections per flight, SUM(passengers) - REG

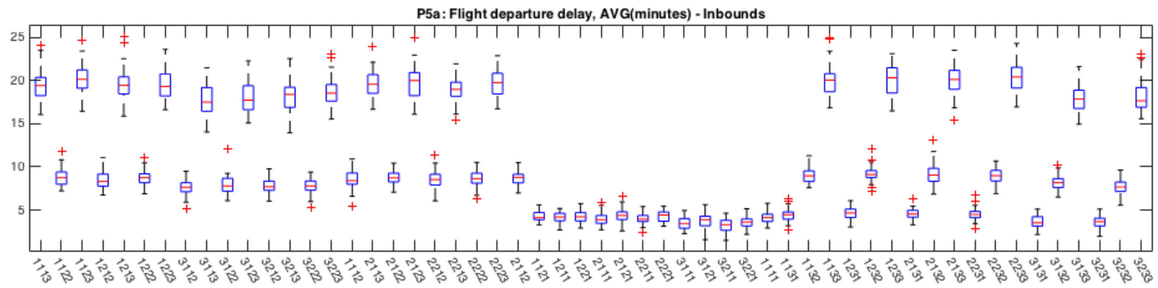

P5a: Flight departure delay, AVG(minutes) - ALL

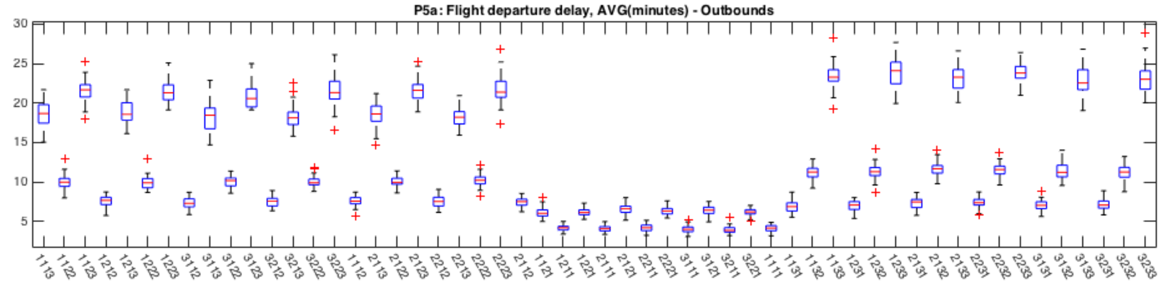

P5a: Flight departure delay, AVG(minutes) - CHT

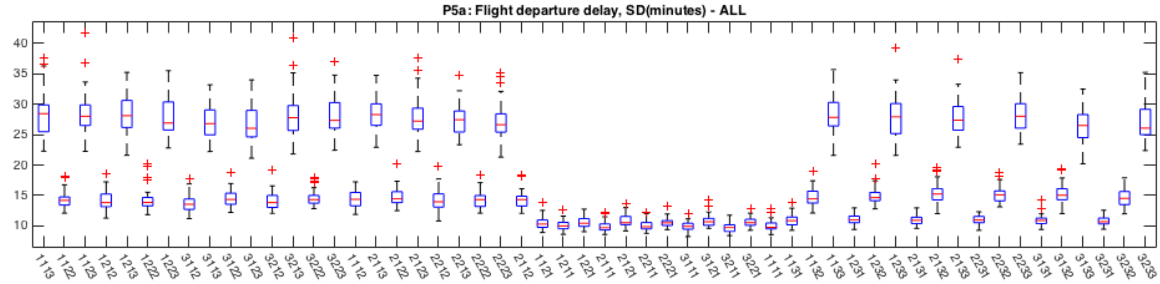

P5a: Flight departure delay, AVG(minutes) - FSC

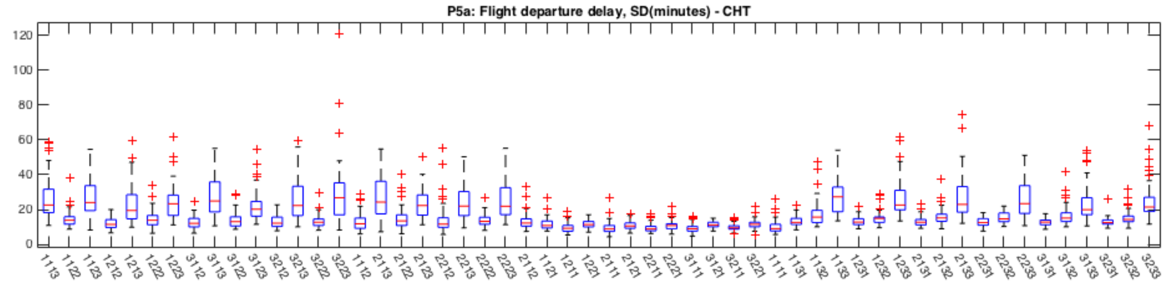

P5a: Flight departure delay, AVG(minutes) - LCC

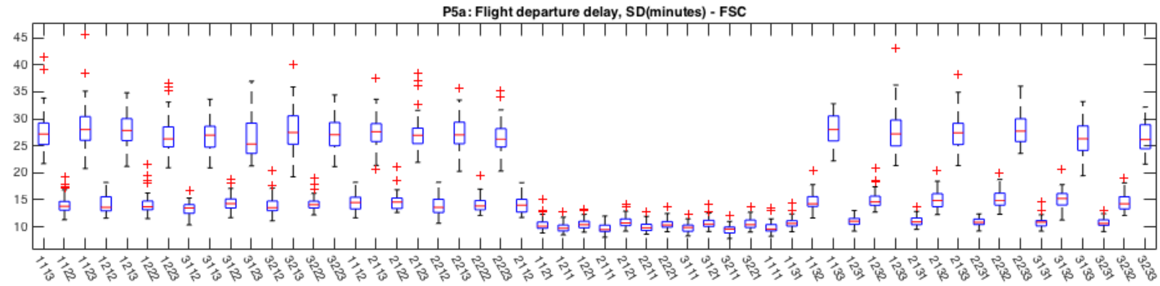

P5a: Flight departure delay, AVG(minutes) - REG

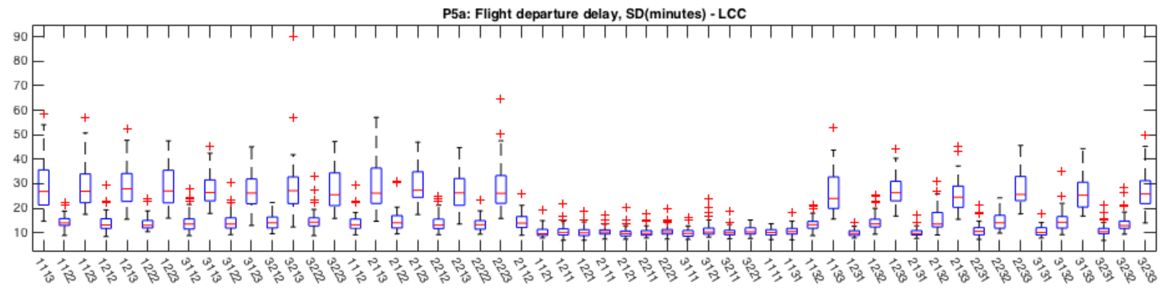

P5a: Flight departure delay, AVG(minutes) - Inbounds

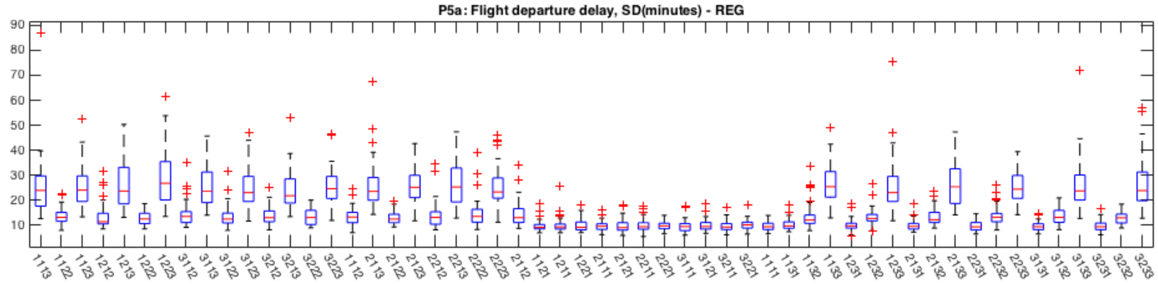

P5a: Flight departure delay, AVG(minutes) - Outbounds

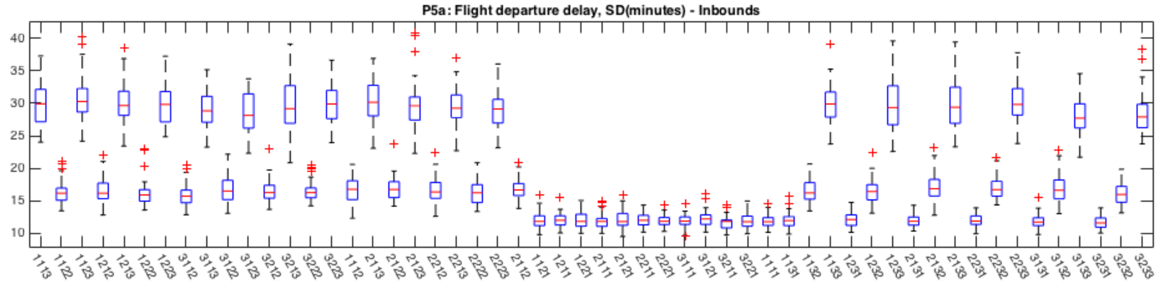

P5a: Flight departure delay, SD(minutes) - ALL

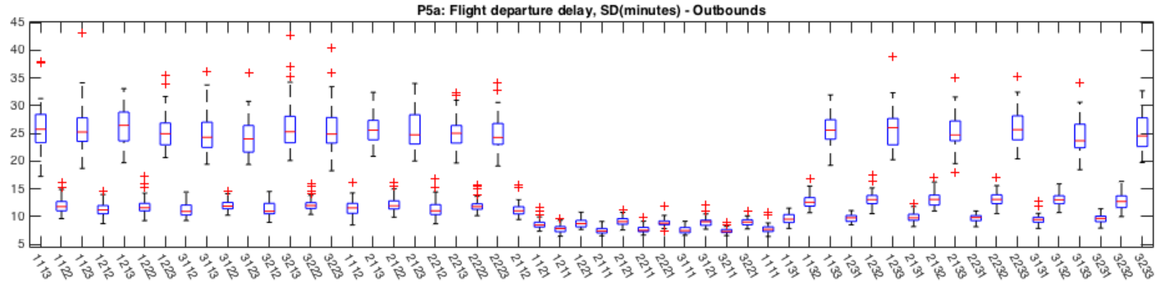

P5a: Flight departure delay, SD(minutes) - CHT

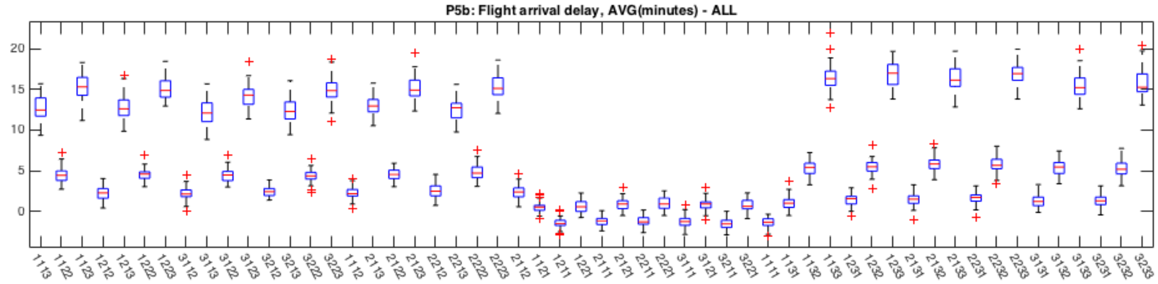

P5a: Flight departure delay, SD(minutes) - FSC

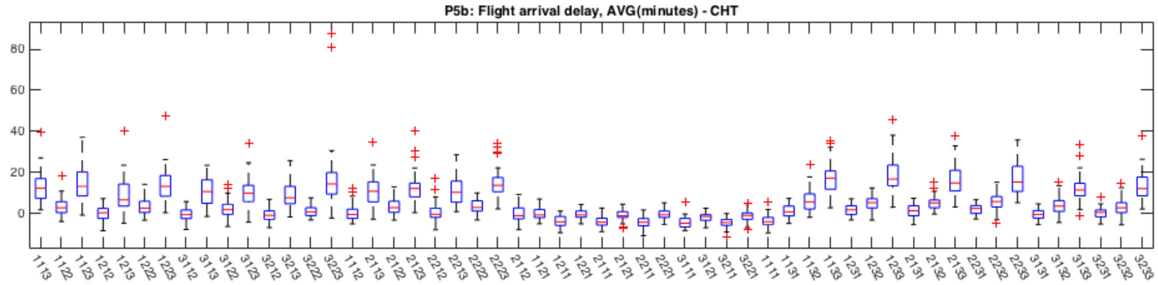

P5a: Flight departure delay, SD(minutes) - LCC

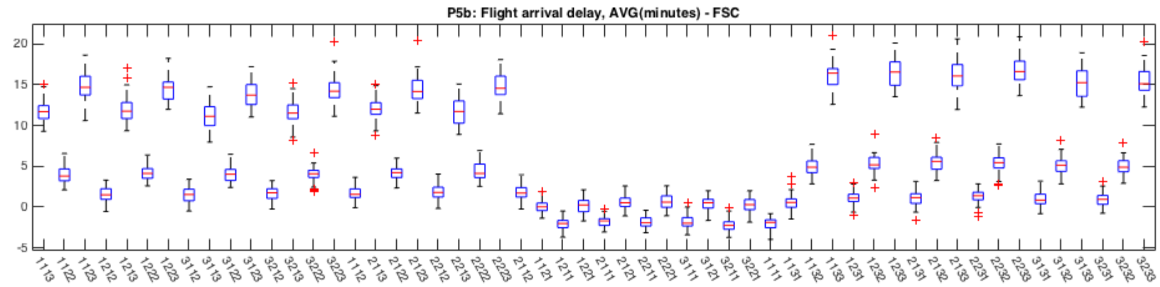

P5a: Flight departure delay, SD(minutes) - REG

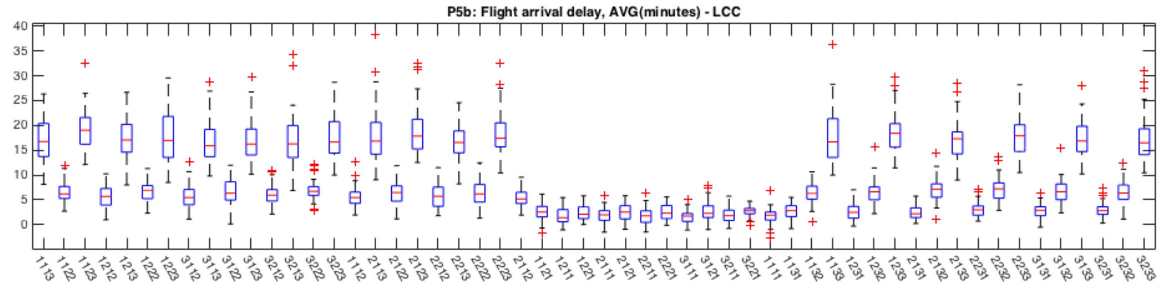

P5a: Flight departure delay, SD(minutes) - Inbounds

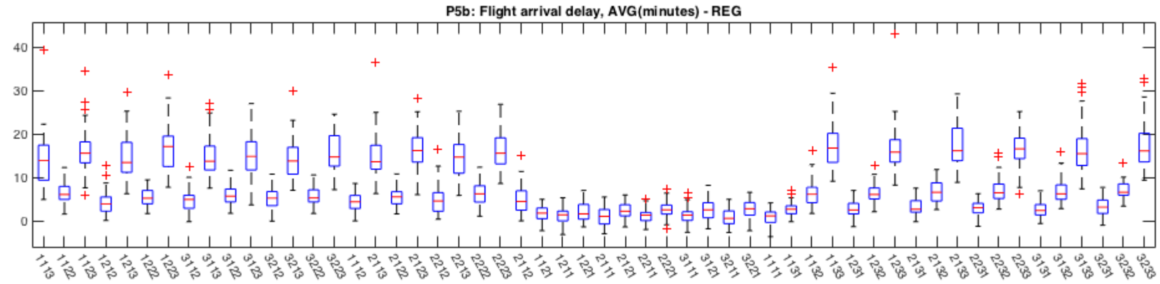

P5a: Flight departure delay, SD(minutes) - Outbounds

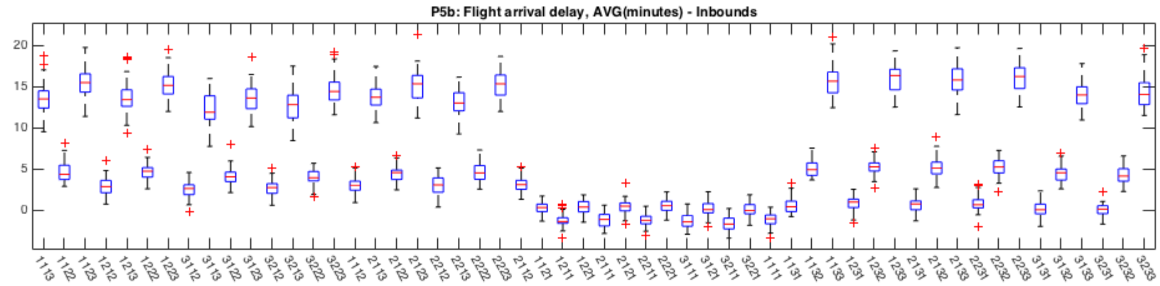

P5b: Flight arrival delay, AVG(minutes) - ALL

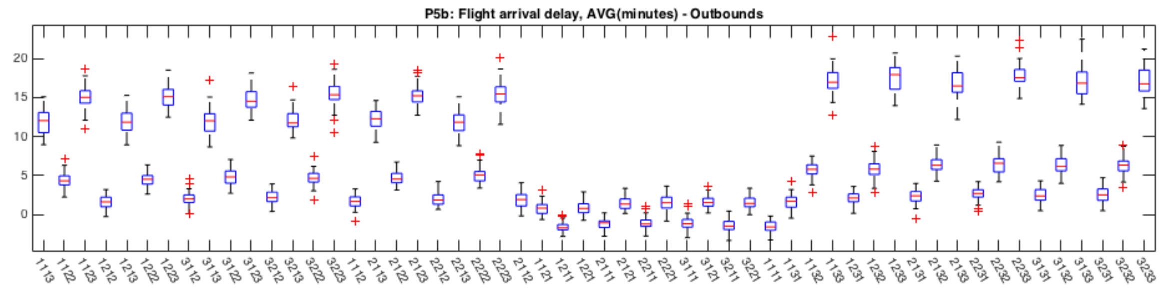

P5b: Flight arrival delay, AVG(minutes) - CHT

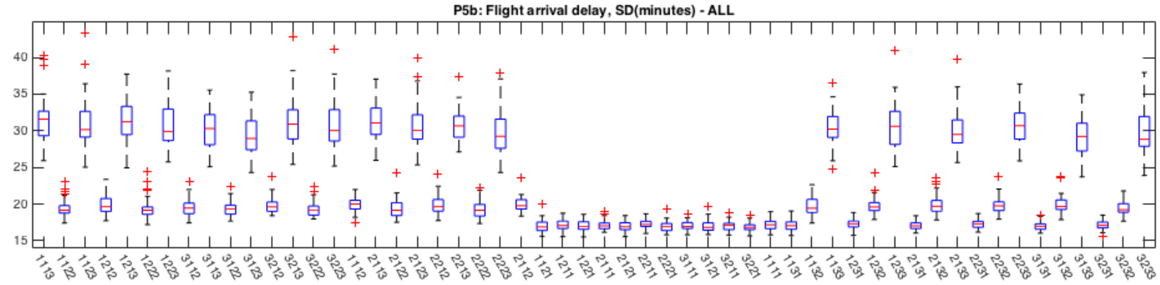

P5b: Flight arrival delay, AVG(minutes) - FSC

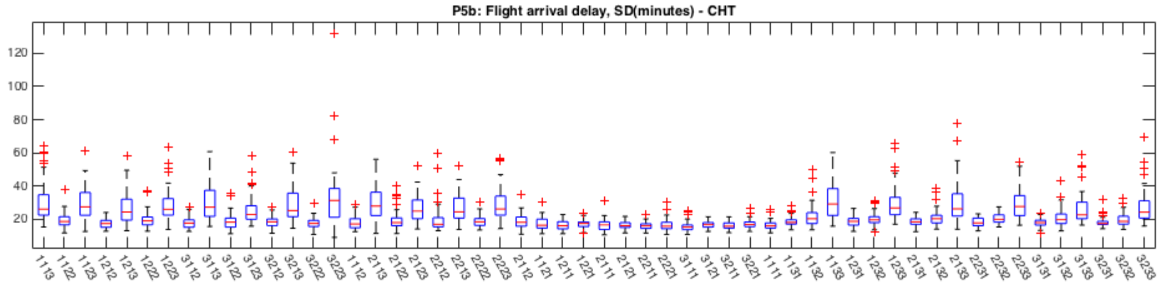

P5b: Flight arrival delay, AVG(minutes) - LCC

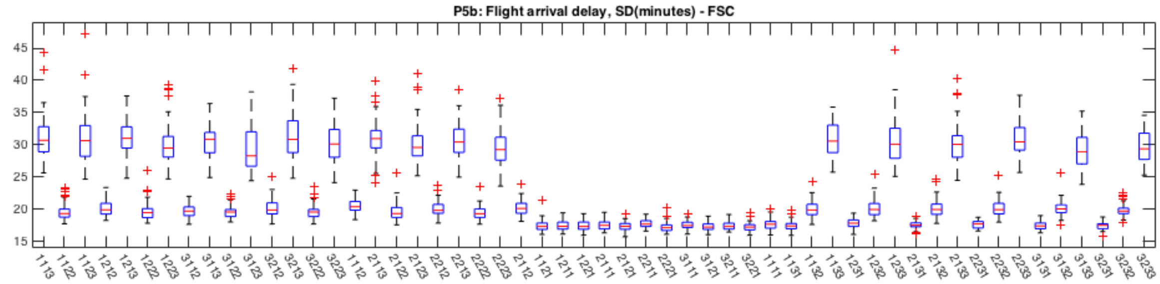

P5b: Flight arrival delay, AVG(minutes) - REG

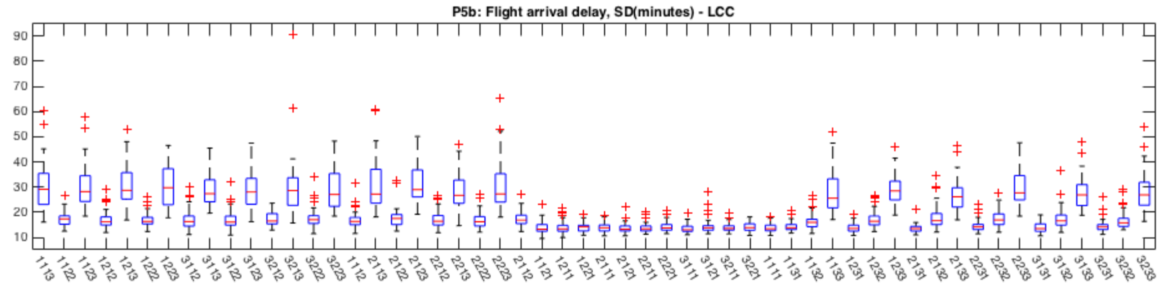

P5b: Flight arrival delay, AVG(minutes) - Inbounds

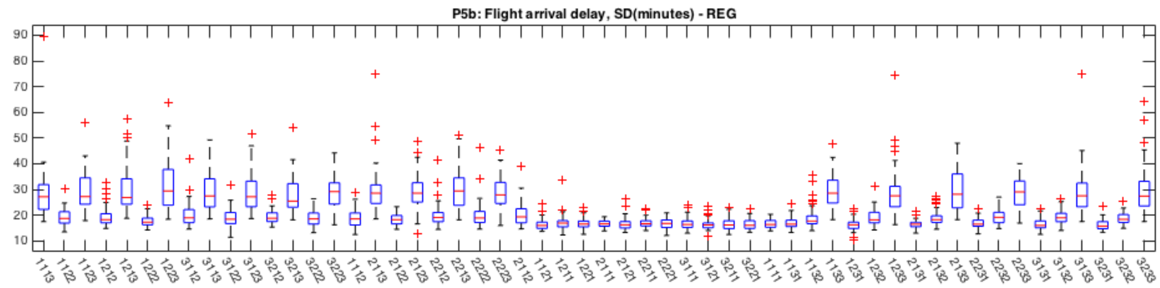

P5b: Flight arrival delay, AVG(minutes) - Outbounds

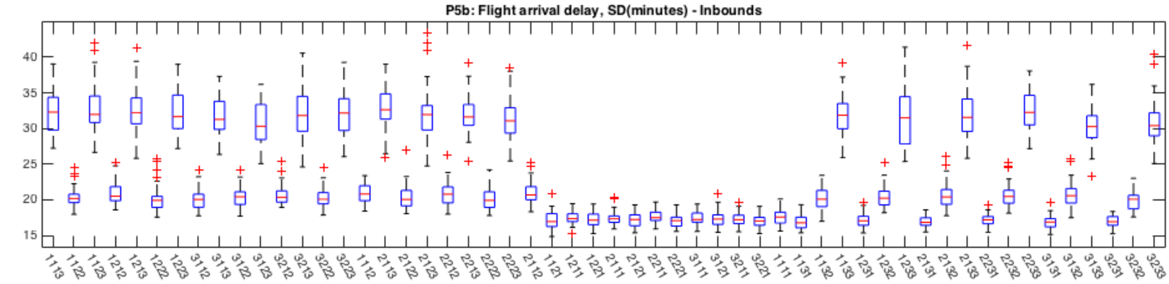

P5b: Flight arrival delay, SD(minutes) - ALL

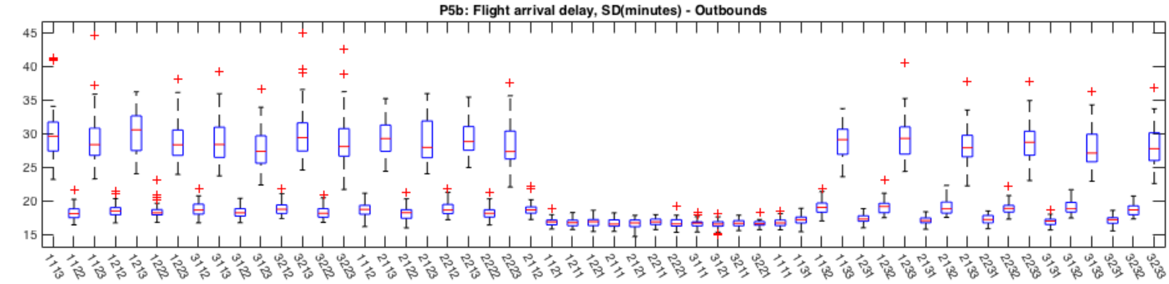

P5b: Flight arrival delay, SD(minutes) - CHT

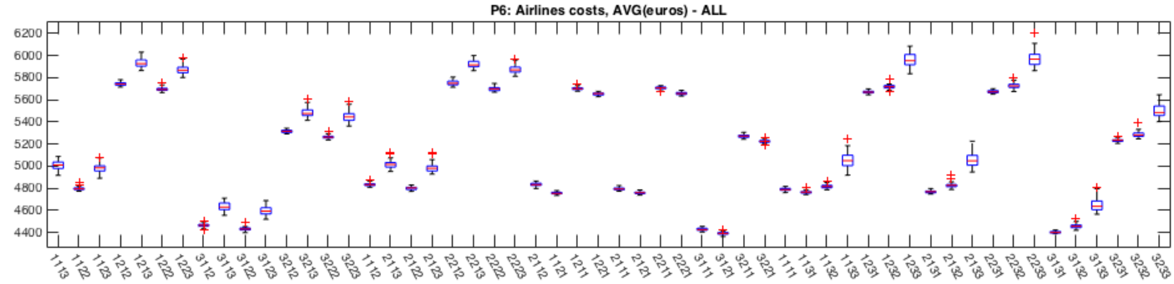

P5b: Flight arrival delay, SD(minutes) - FSC

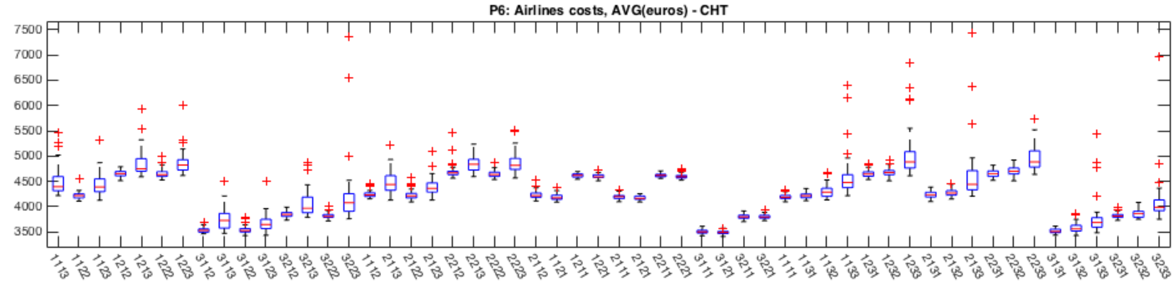

P5b: Flight arrival delay, SD(minutes) - LCC

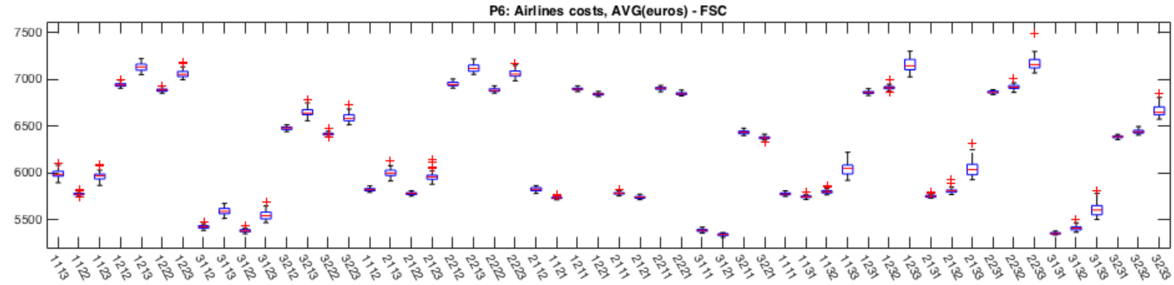

P5b: Flight arrival delay, SD(minutes) - REG

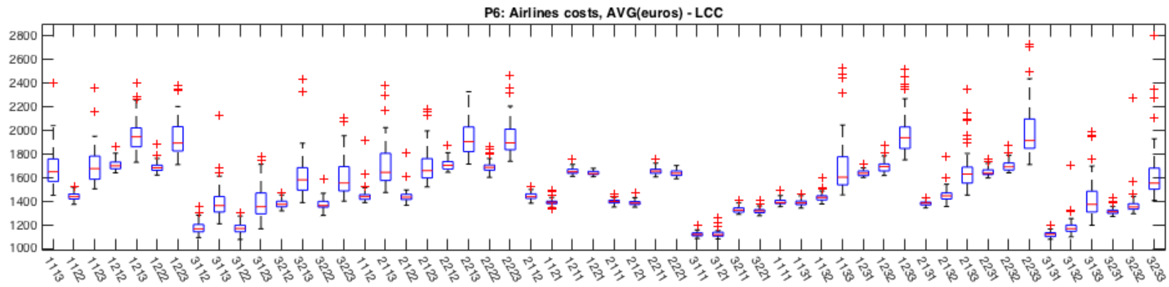

P5b: Flight arrival delay, SD(minutes) - Inbounds

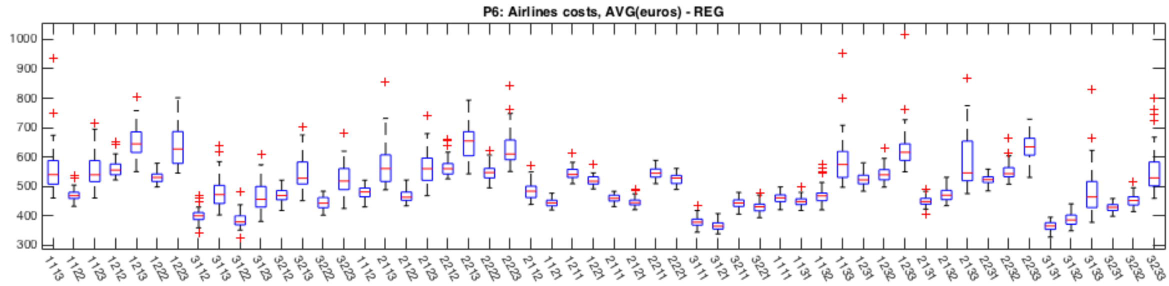

P5b: Flight arrival delay, SD(minutes) - Outbounds

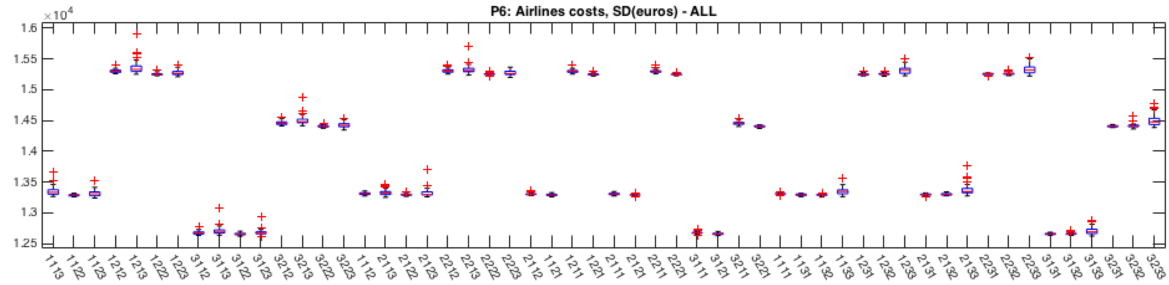

P6: Airlines costs, AVG(euros) - ALL

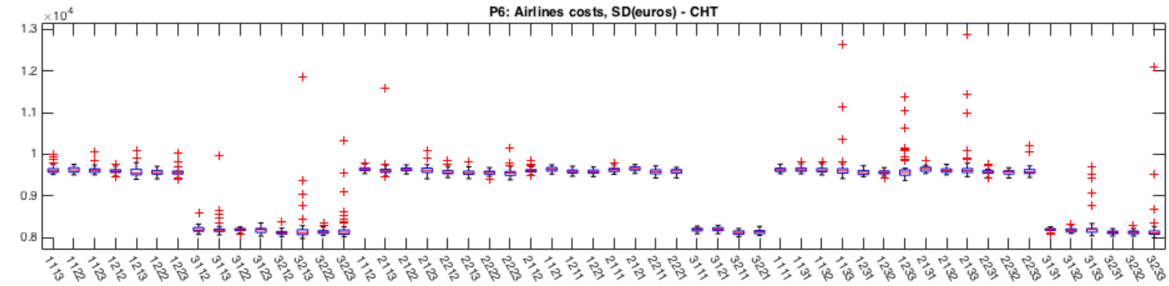

P6: Airlines costs, AVG(euros) - CHT

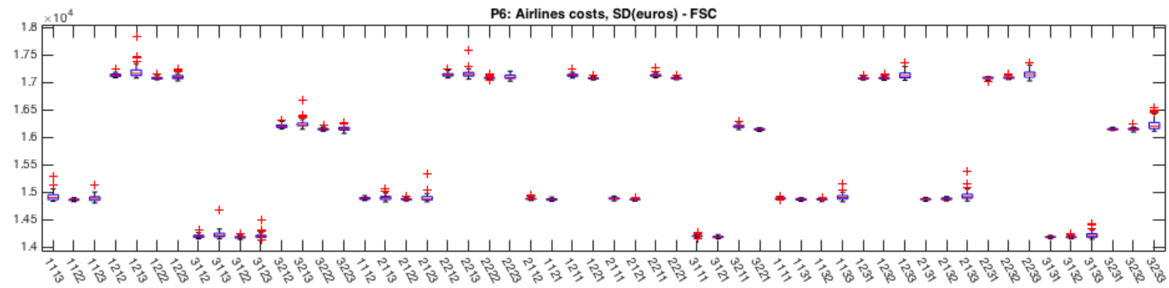

P6: Airlines costs, AVG(euros) - FSC

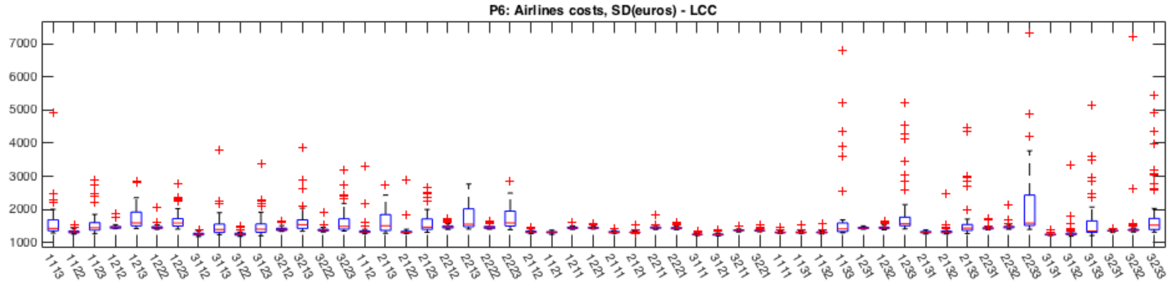

P6: Airlines costs, AVG(euros) - LCC

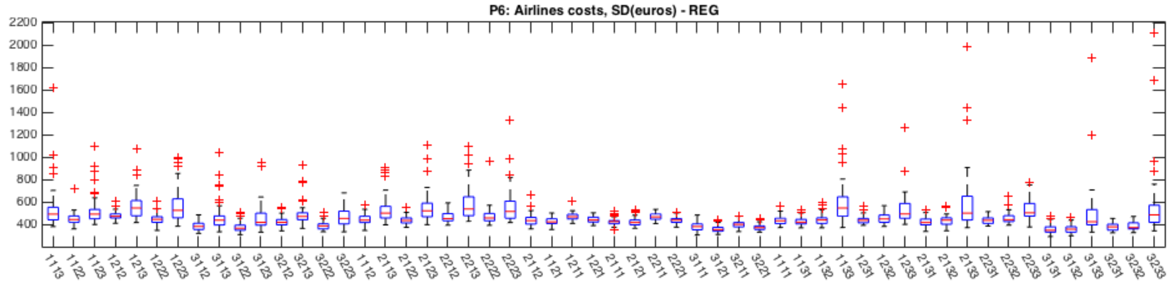

P6: Airlines costs, AVG(euros) - REG

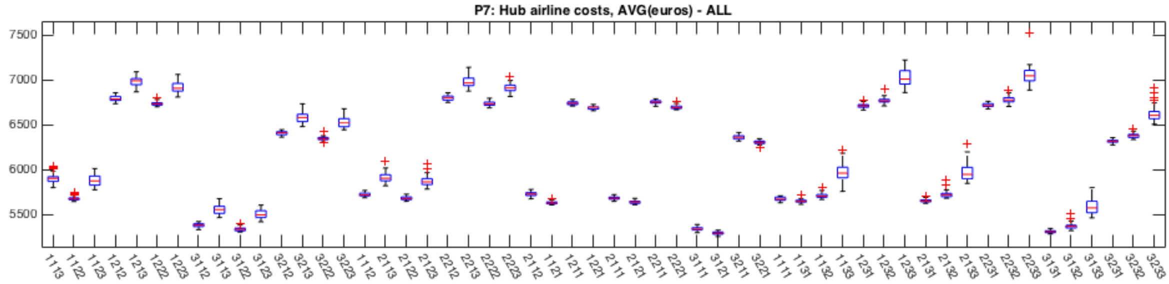

P6: Airlines costs, SD(euros) - ALL

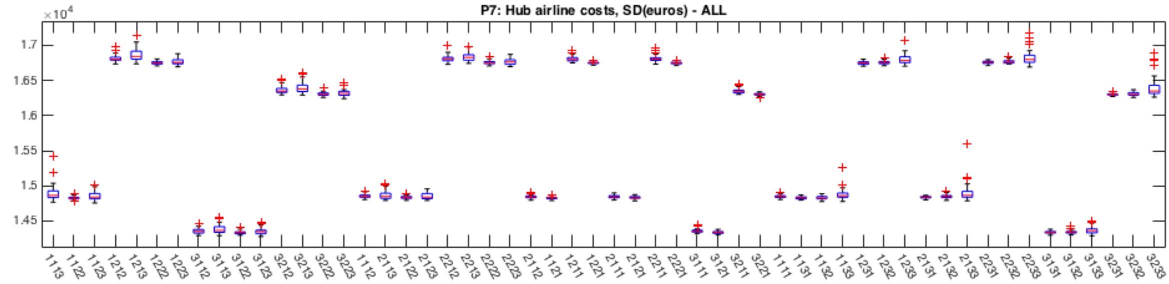

P6: Airlines costs, SD(euros) - CHT

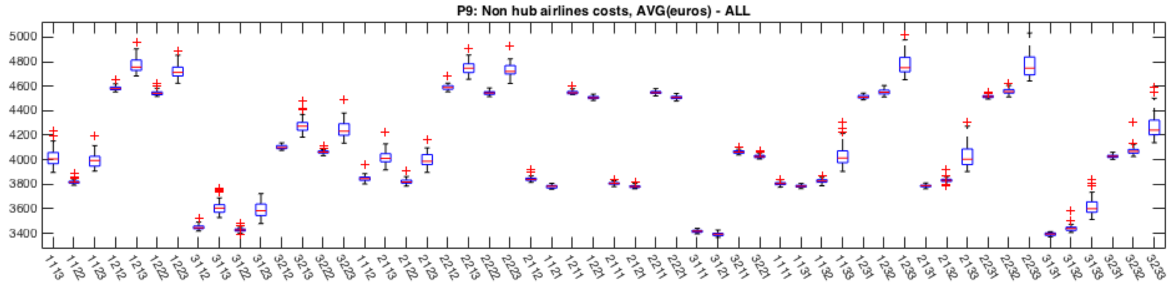

P6: Airlines costs, SD(euros) - FSC

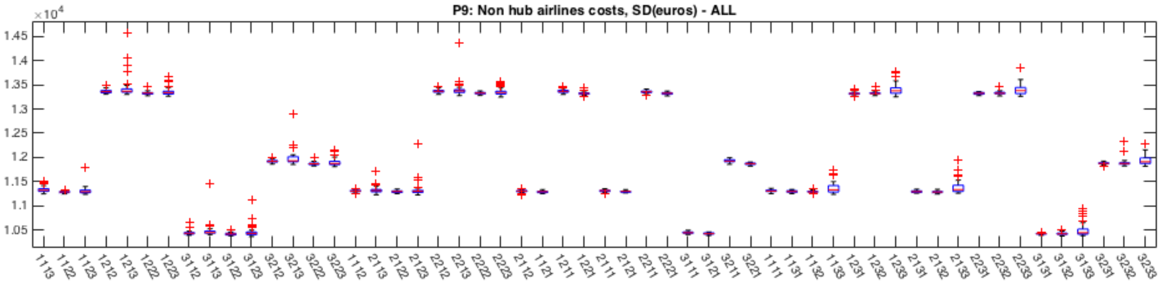

P6: Airlines costs, SD(euros) - LCC

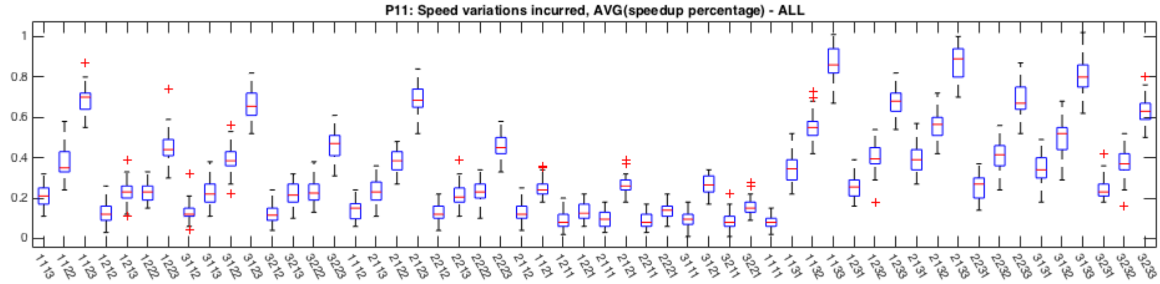

P6: Airlines costs, SD(euros) - REG

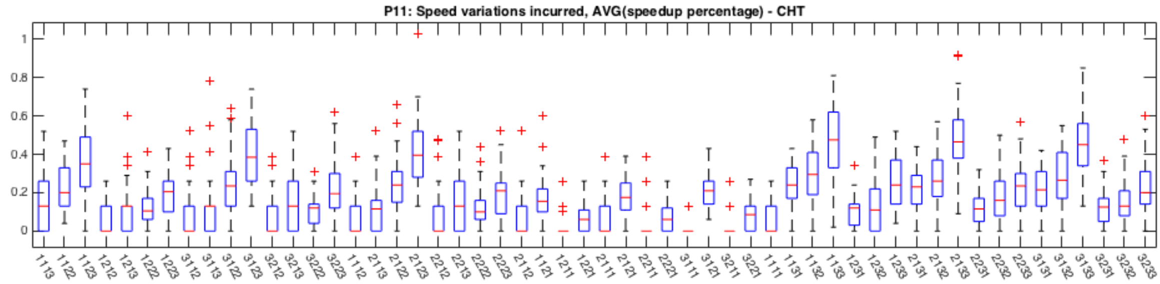

P7: Hub airline costs, AVG(euros) - ALL

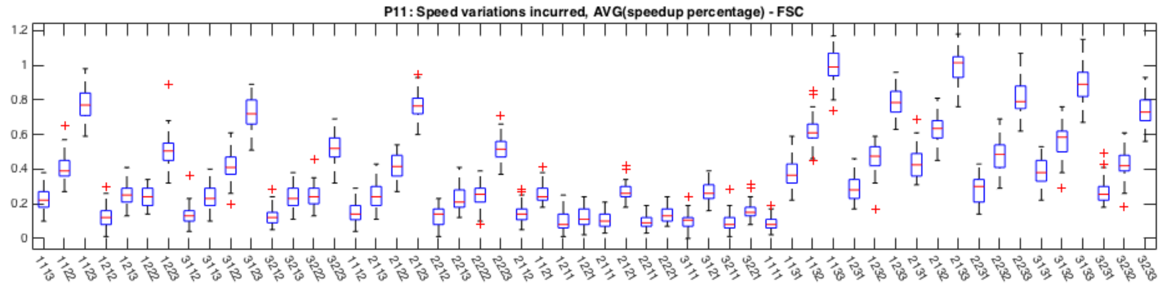

P7: Hub airline costs, SD(euros) - ALL


P9: Non hub airlines costs, AVG(euros) - ALL


P9: Non hub airlines costs, SD(euros) - ALL


P11: Speed variations incurred, AVG(speedup percentage) - ALL


P11: Speed variations incurred, AVG(speedup percentage) - CHT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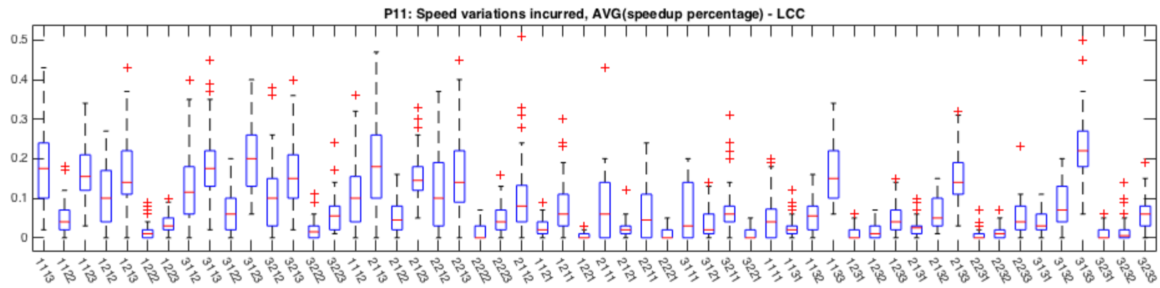
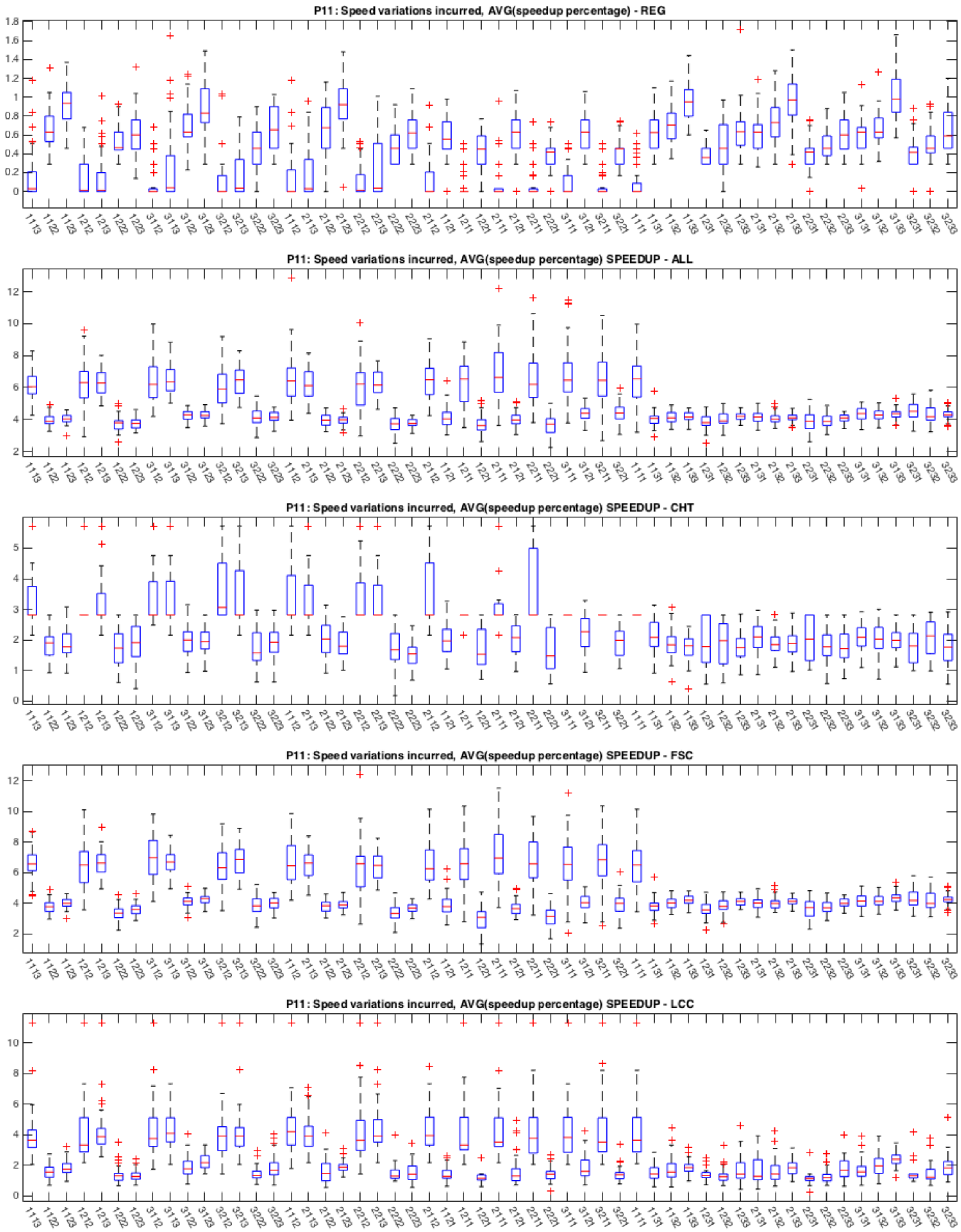
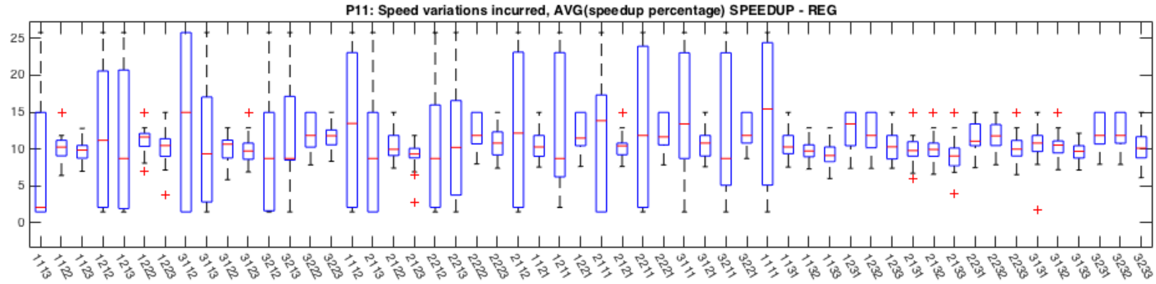
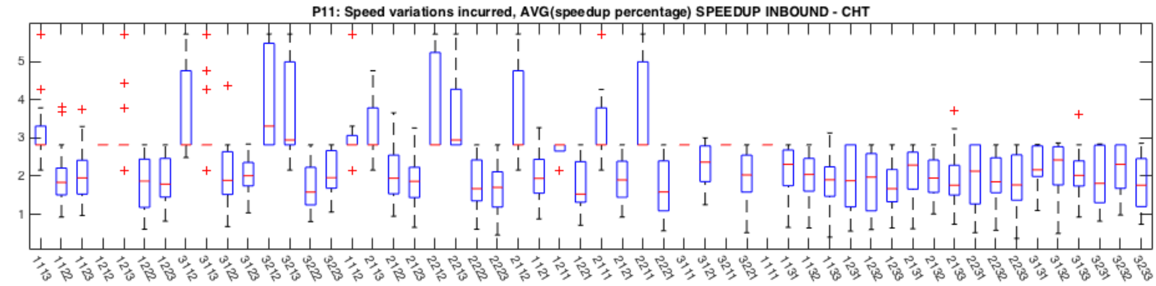
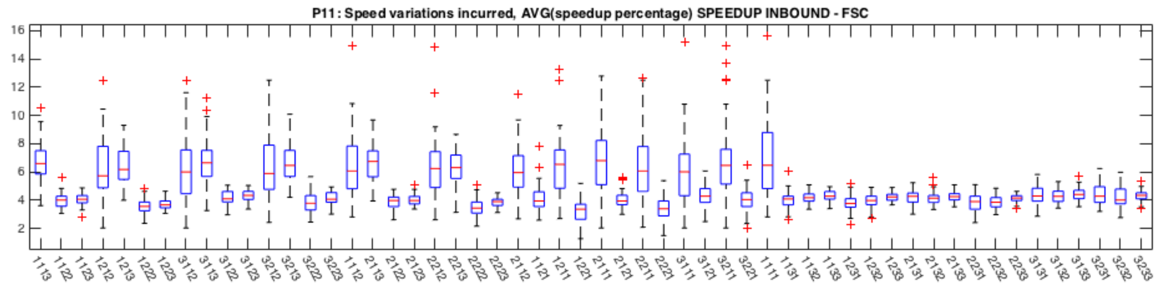
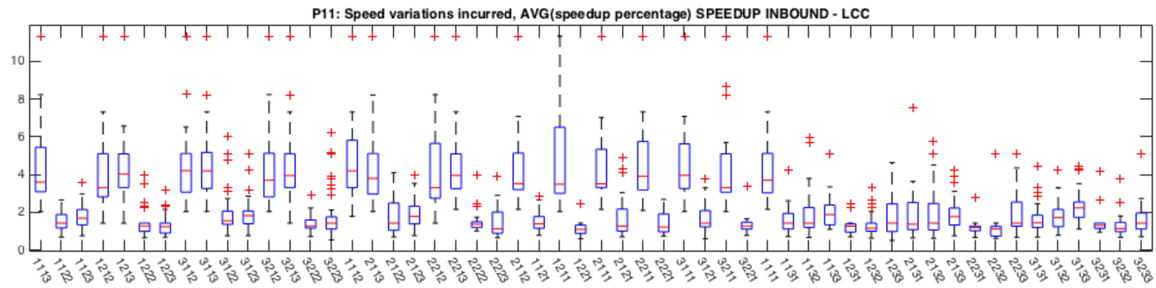

P11: Speed variations incurred, AVG(speedup percentage) - LCC

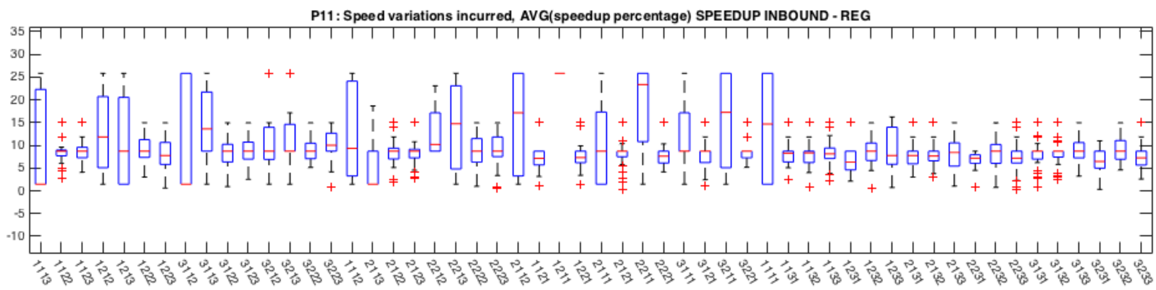

P11: Speed variations incurred, AVG(speedup percentage) - REG
P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP - ALL
P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP - CHT
P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP - FSC
P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP - LCC


P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP - REG


P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP INBOUND - CHT


P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP INBOUND - FSC


P11: Speed variations incurred, AVG(speedup percentage) SPEEDUP INBOUND - LCC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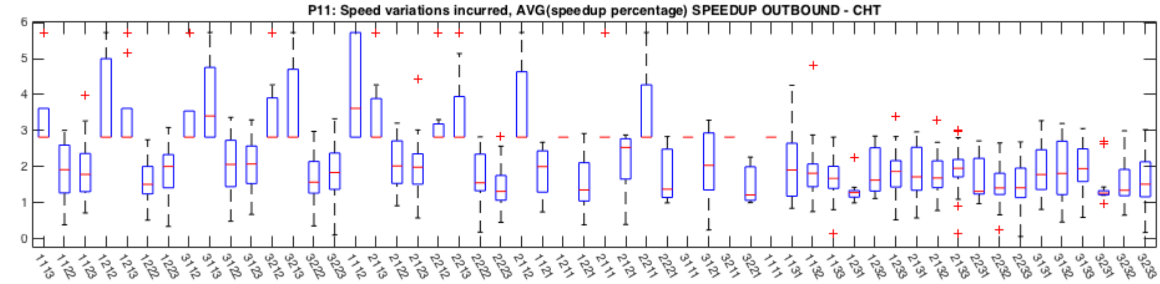
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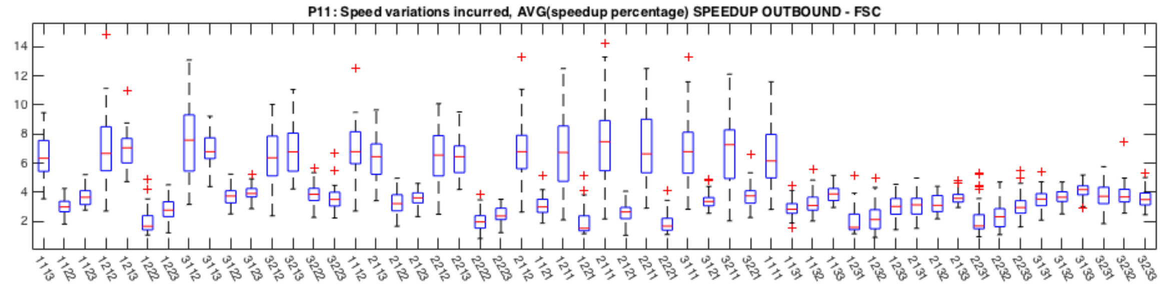
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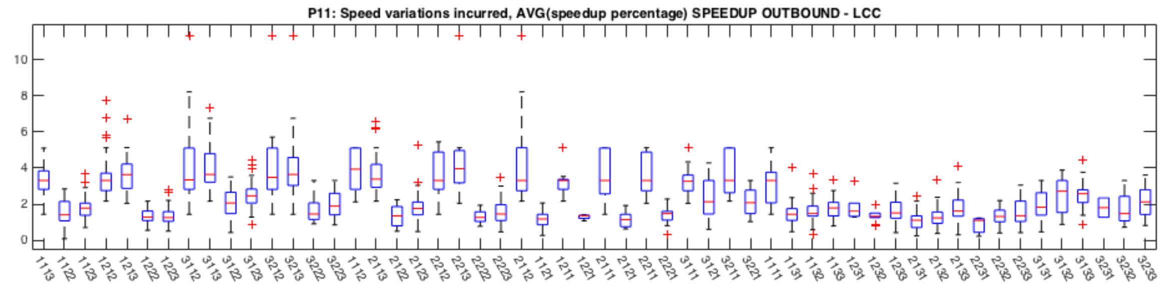
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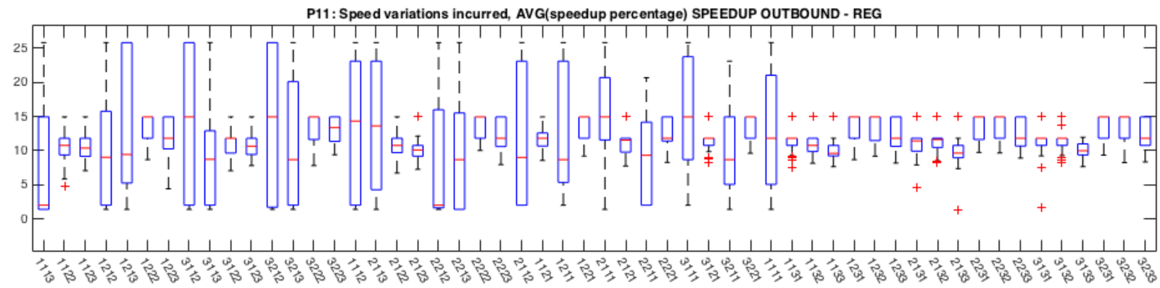
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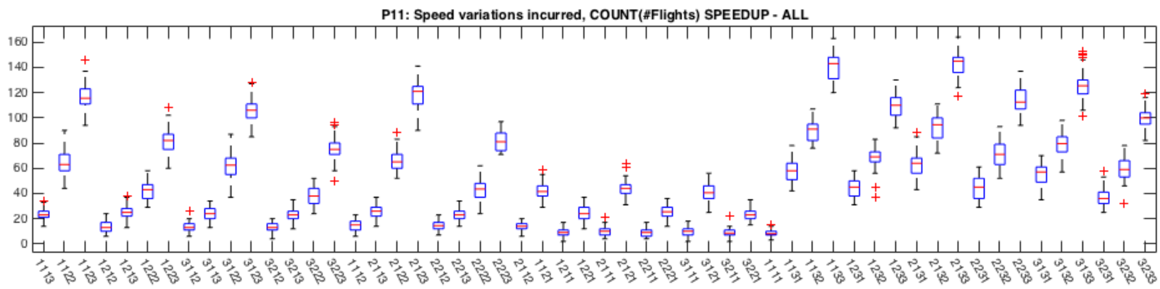
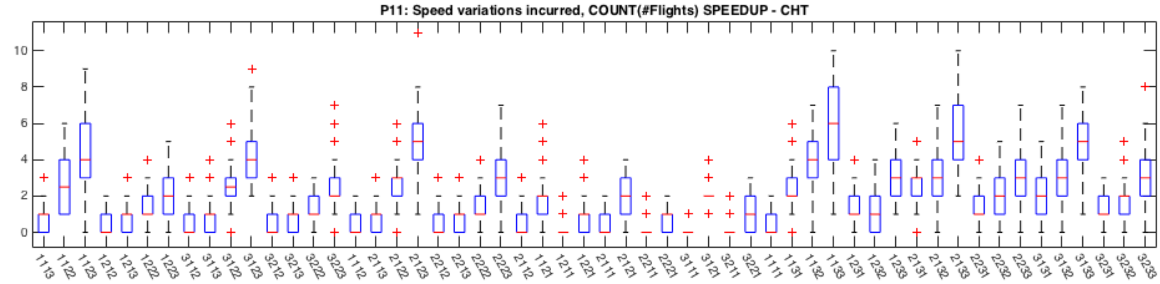
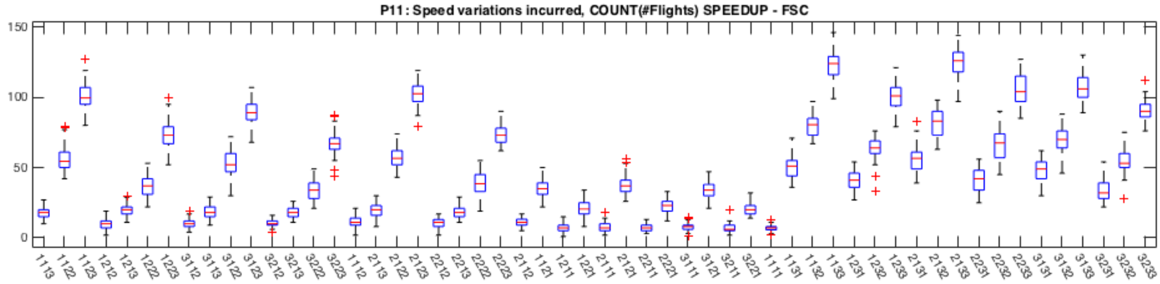

P11: Speed variations incurred, COUNT(#Flights) SPEEDUP - ALL


P11: Speed variations incurred, COUNT(#Flights) SPEEDUP - CHT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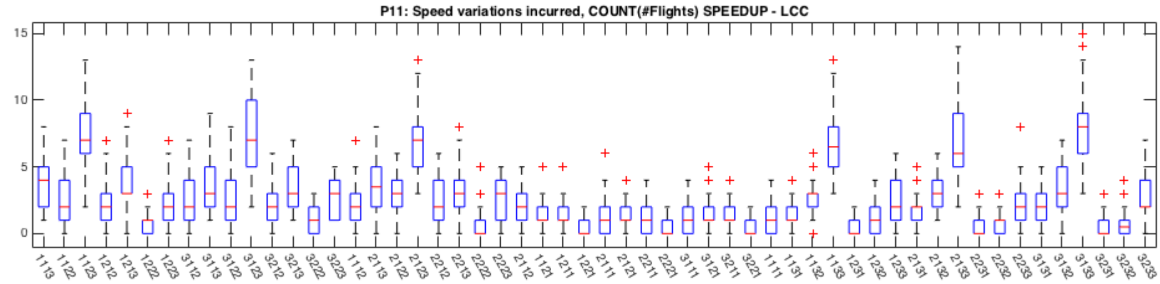
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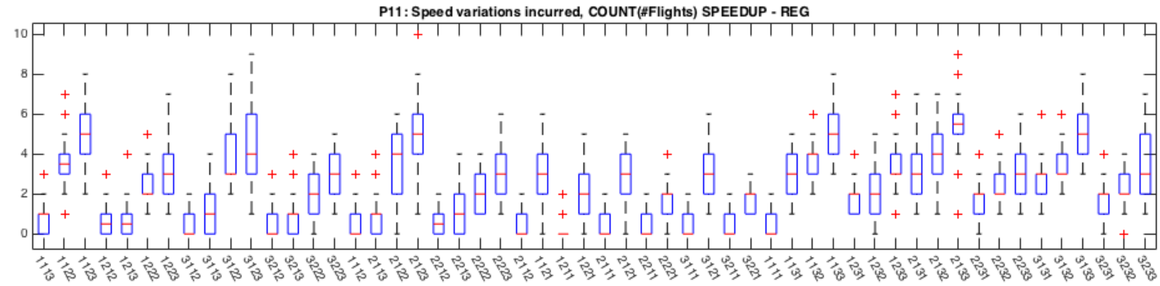
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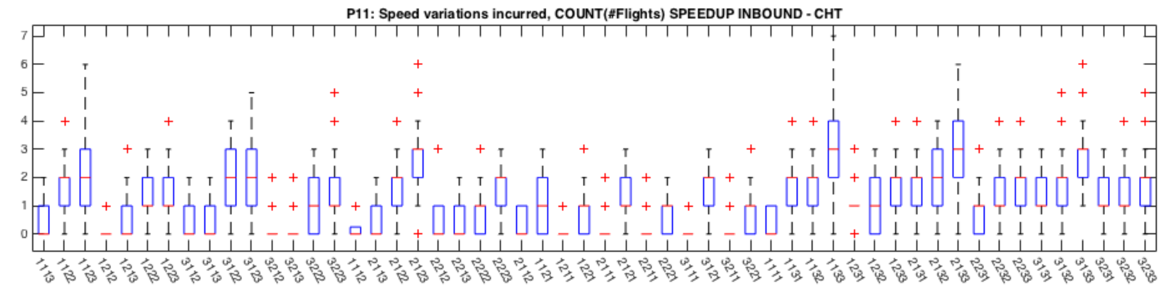
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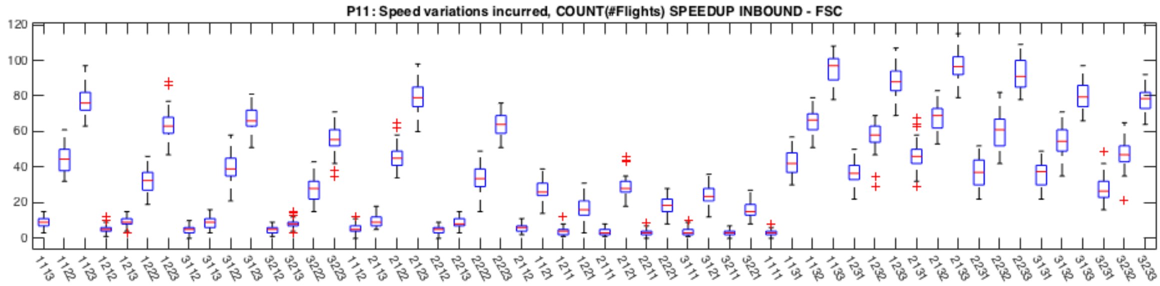
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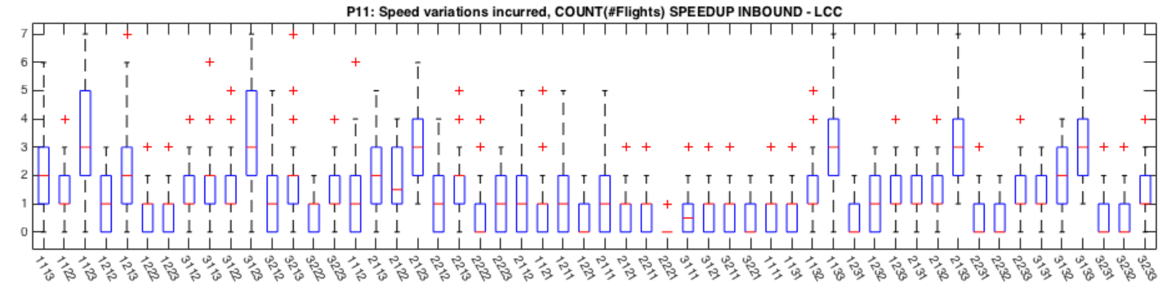
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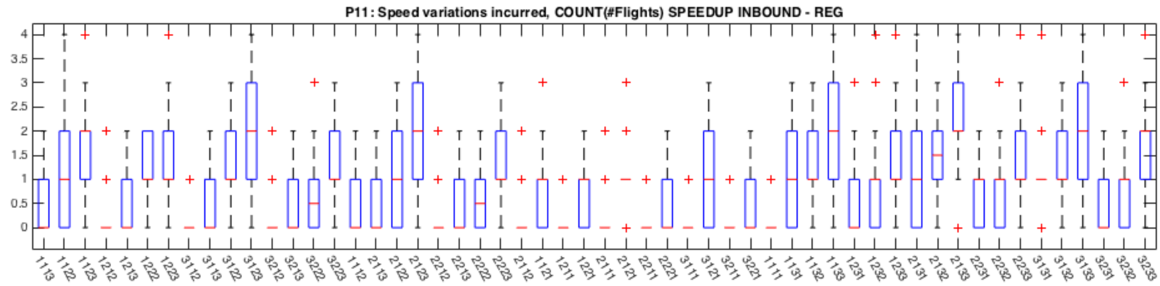
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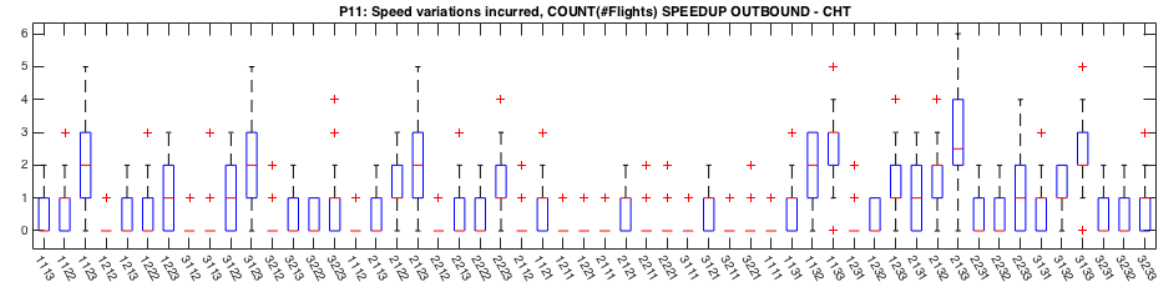
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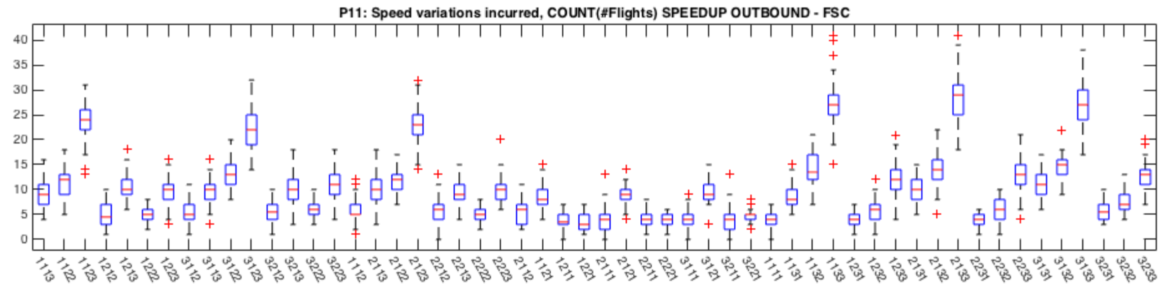
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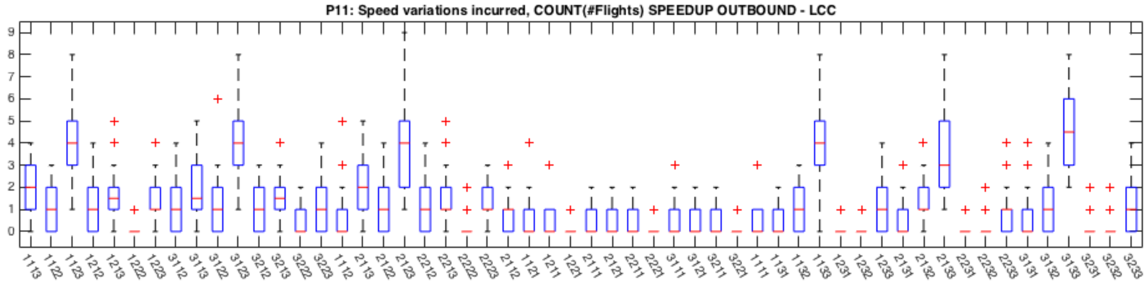
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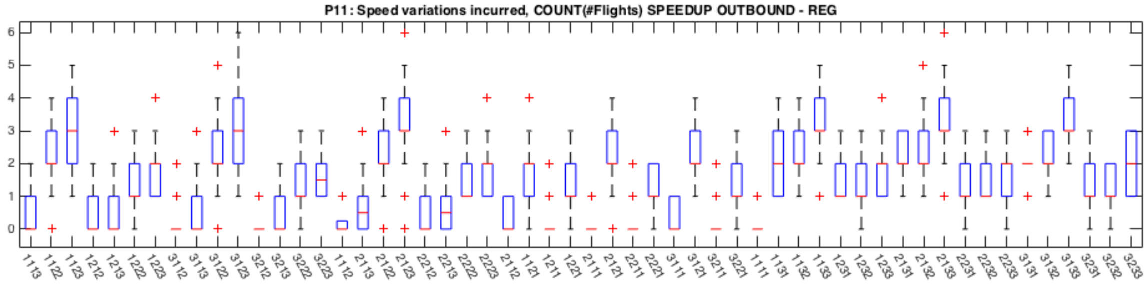
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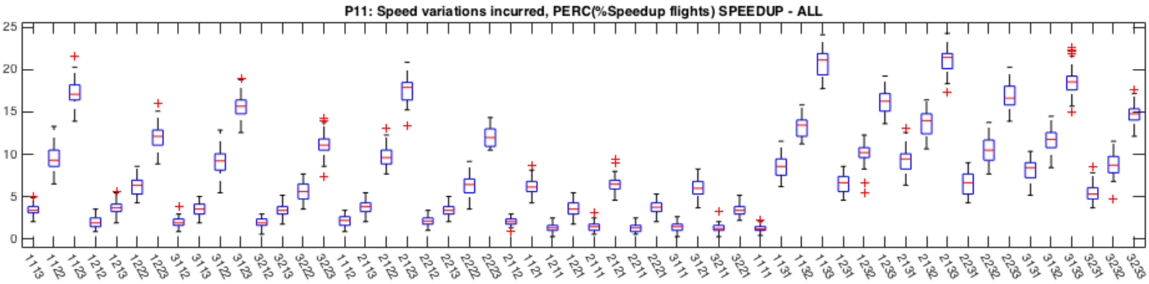
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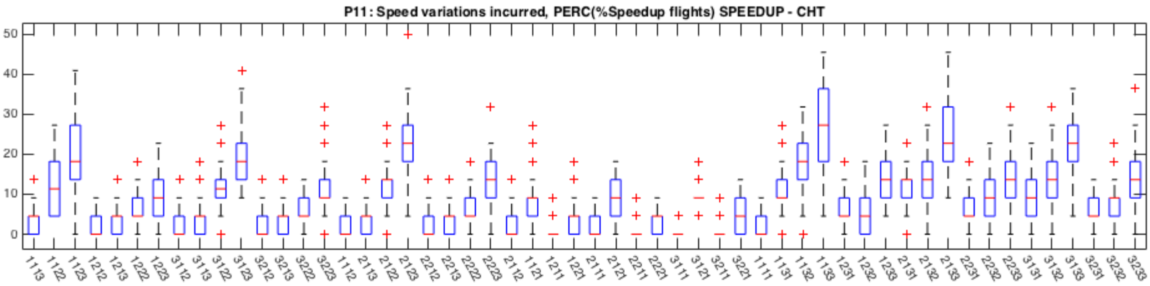
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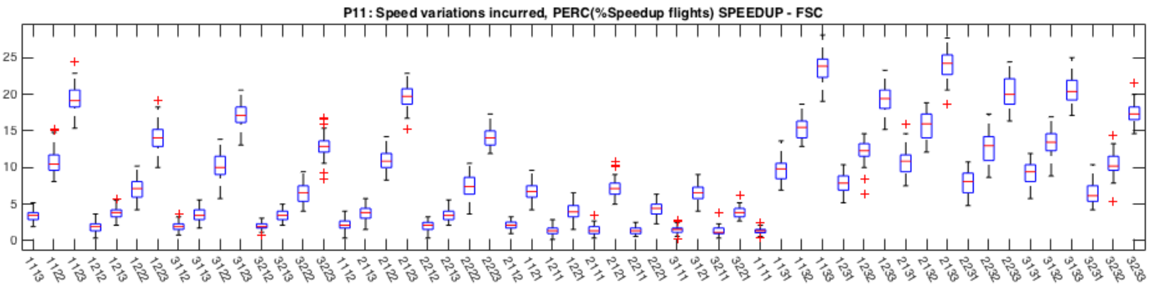
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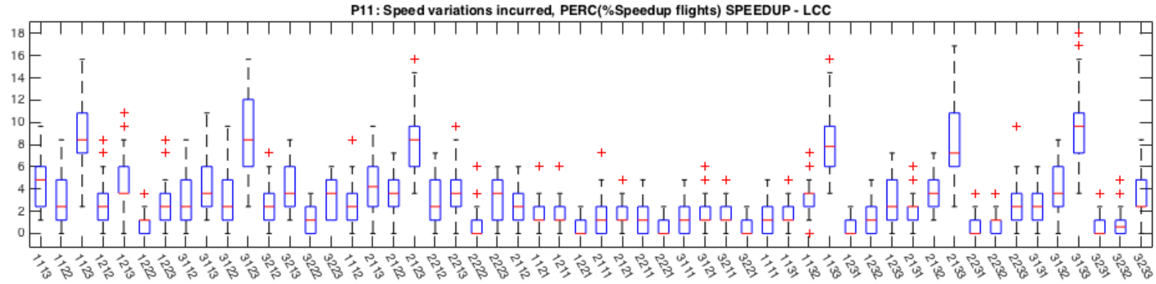
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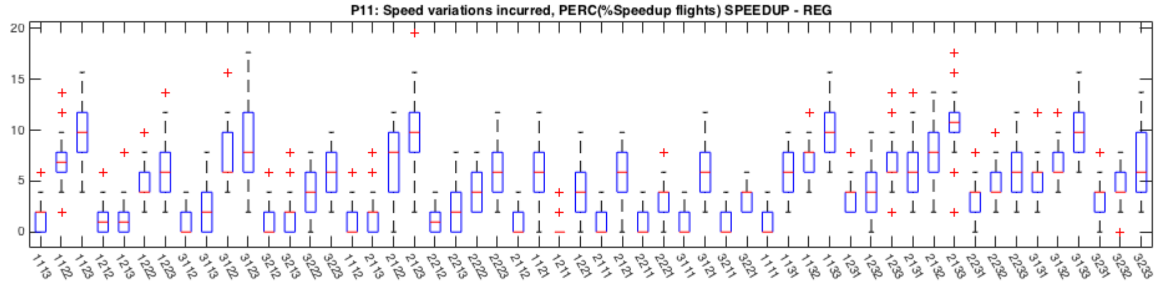
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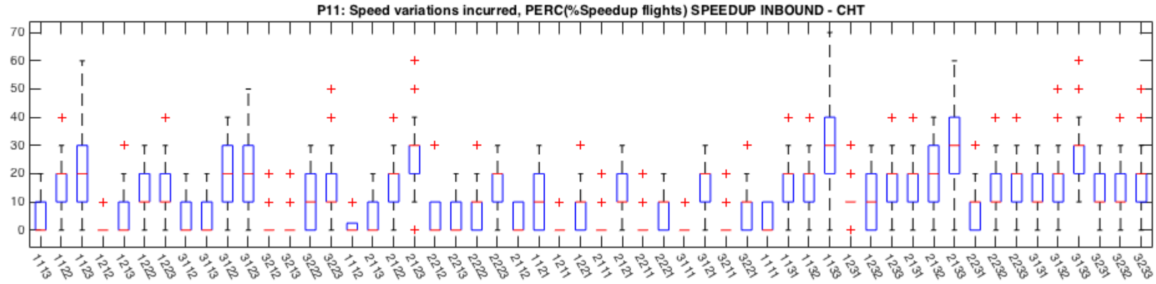
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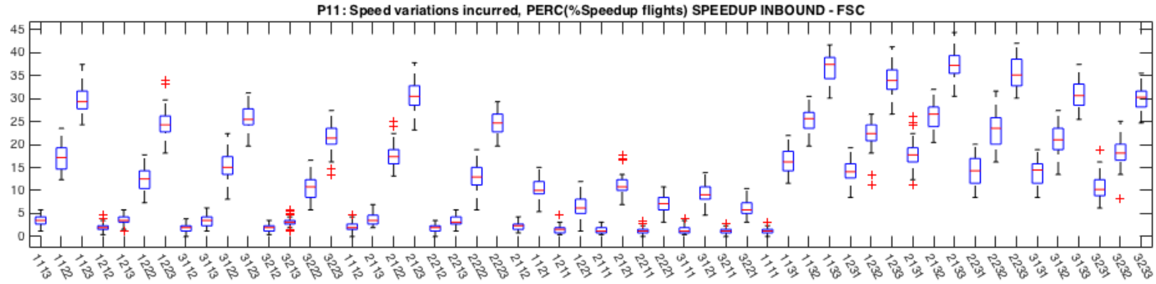
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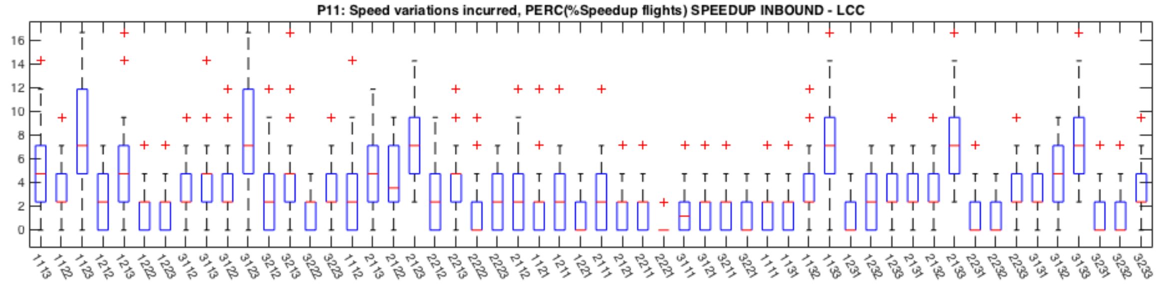
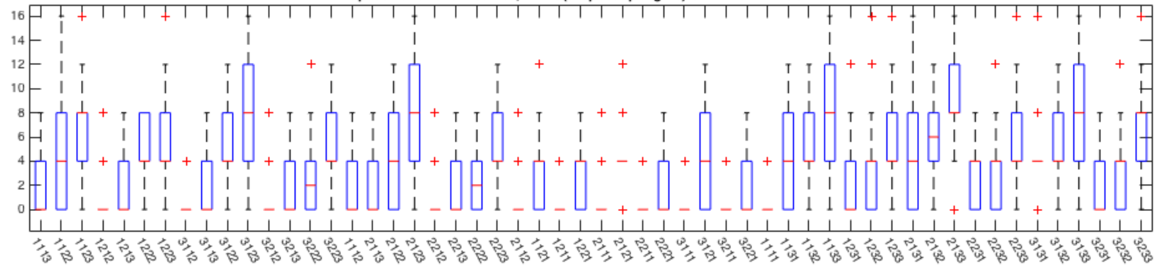
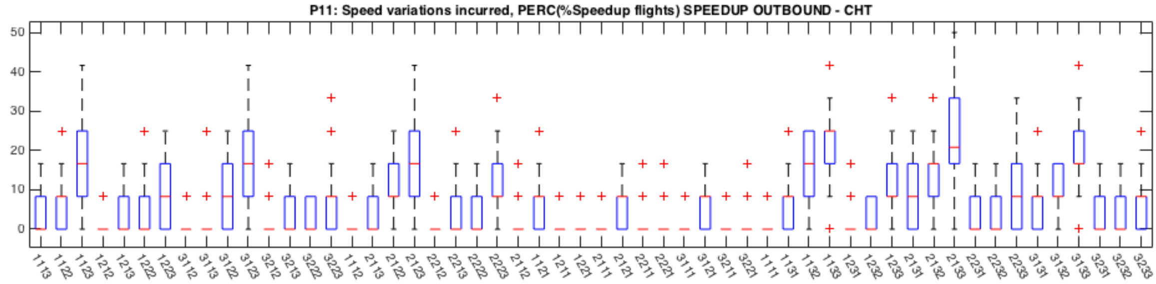

P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP INBOUND - LCC

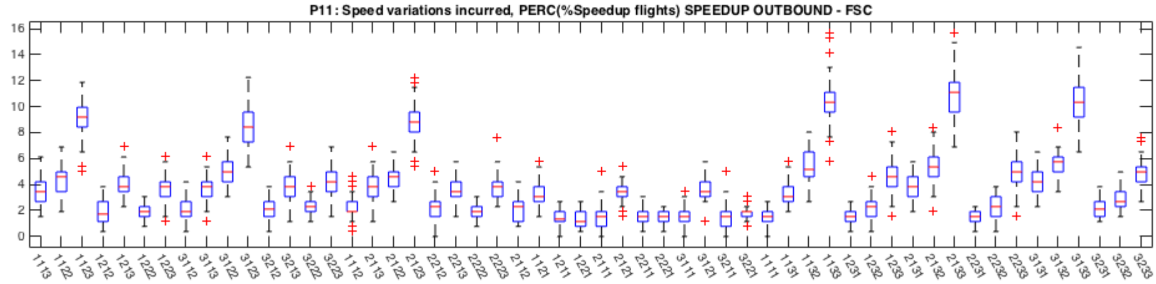
P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP INBOUND - REG



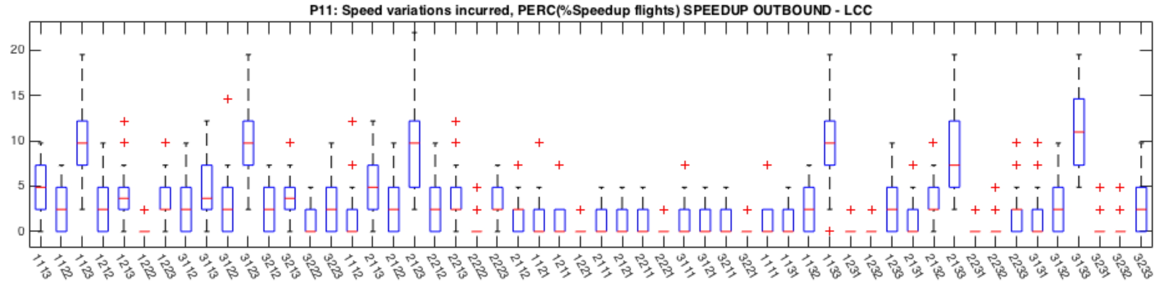
P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP OUTBOUND - CHT



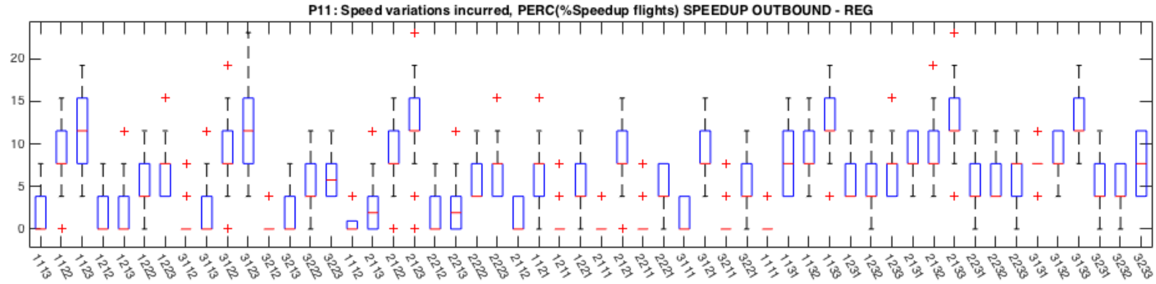
P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP OUTBOUND - FSC

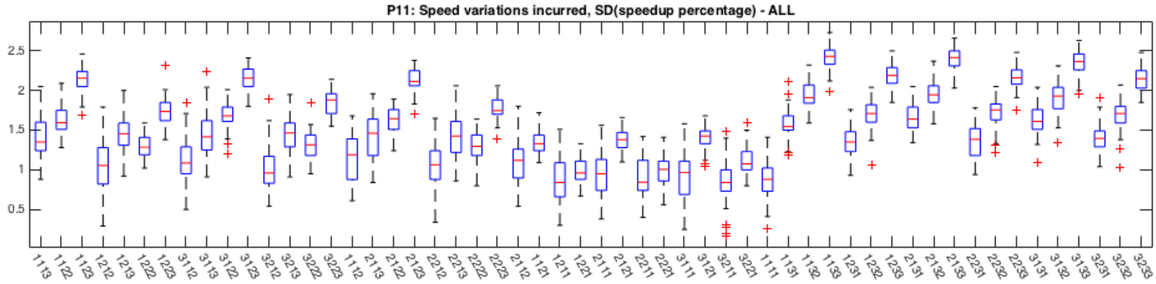


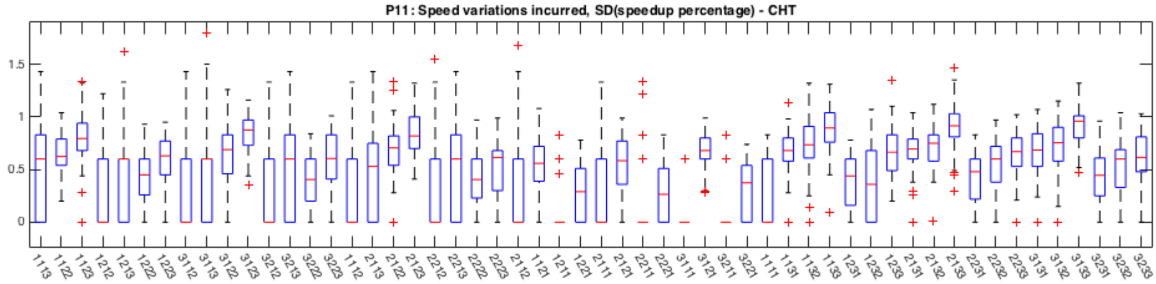
P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP OUTBOUND - LCC



P11: Speed variations incurred, PERC(%Speedup flights) SPEEDUP OUTBOUND - REG




P11: Speed variations incurred, SD(speedup percentage) - ALL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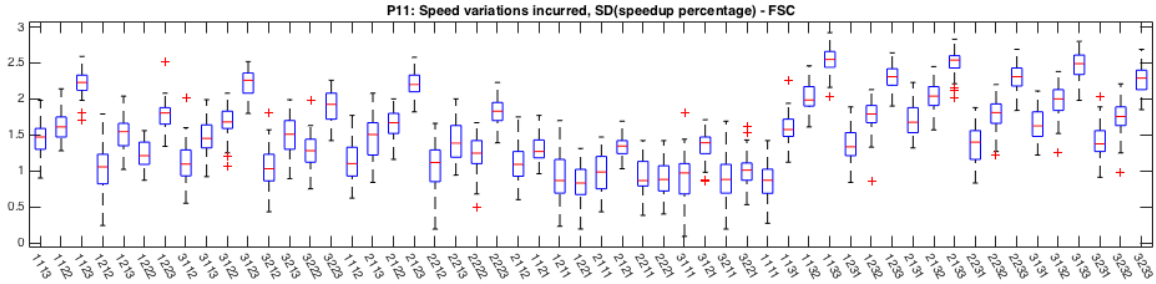
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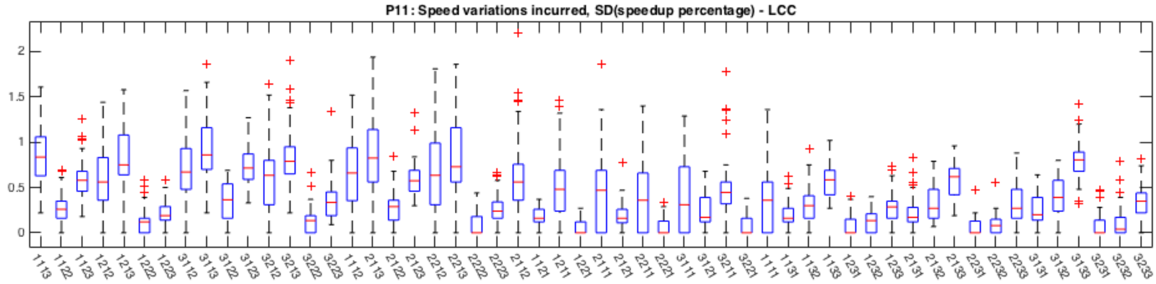
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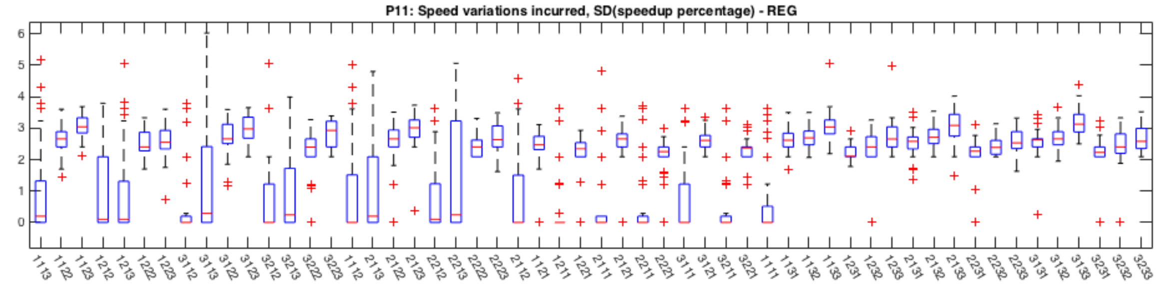
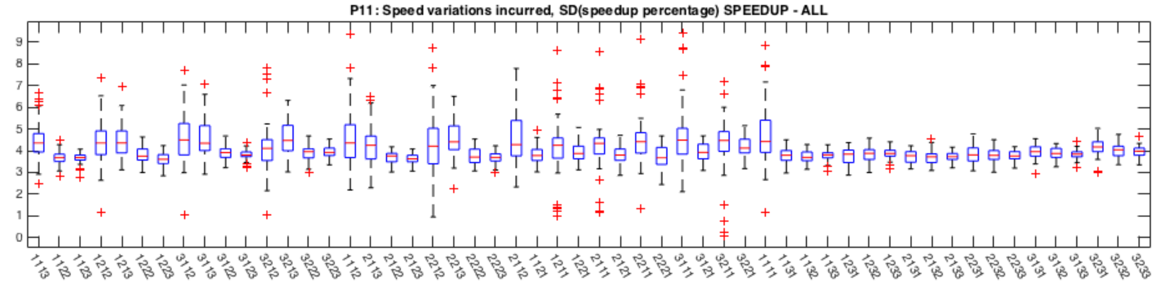
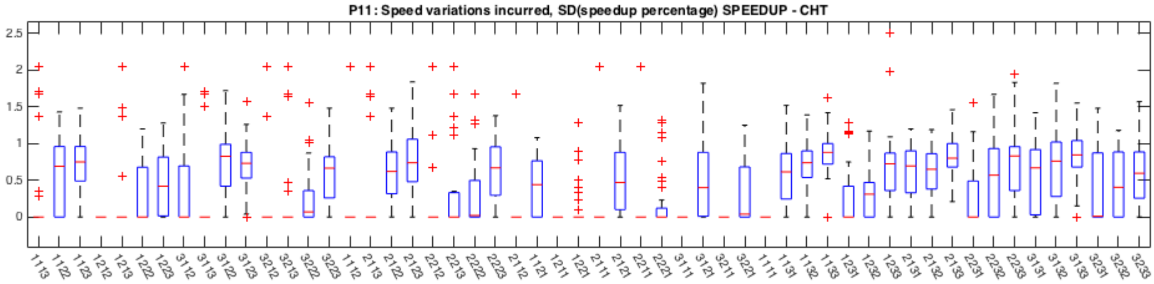

P11: Speed variations incurred, SD(speedup percentage) - REG

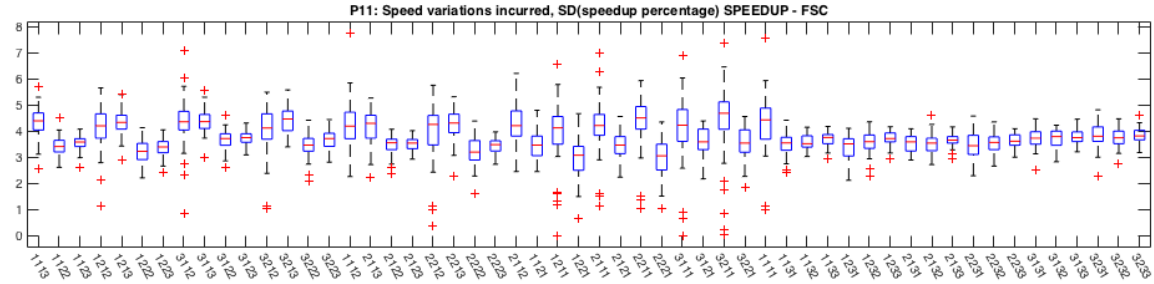
P11: Speed variations incurred, SD(speedup percentage) SPEEDUP - ALL



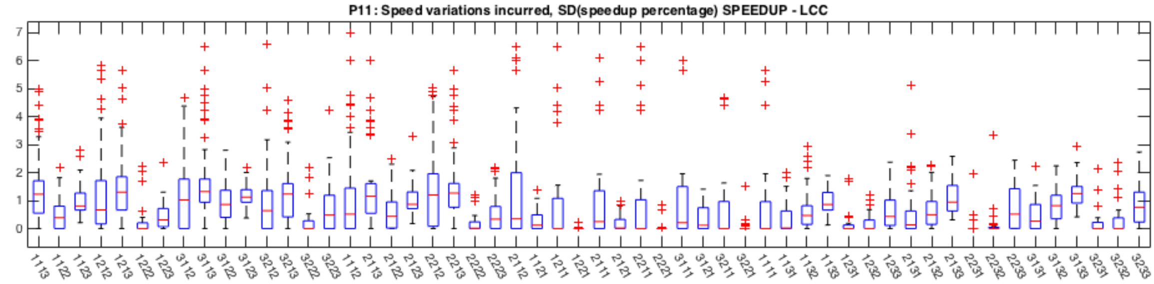
P11: Speed variations incurred, SD(speedup percentage) SPEEDUP - CHT



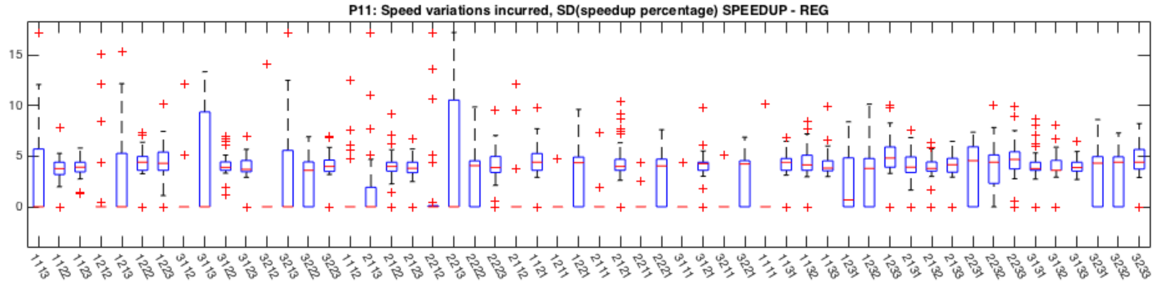
P11: Speed variations incurred, SD(speedup percentage) SPEEDUP - FSC

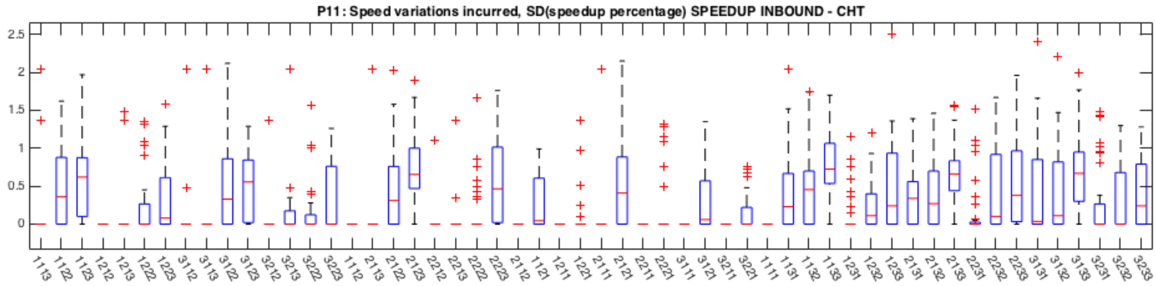


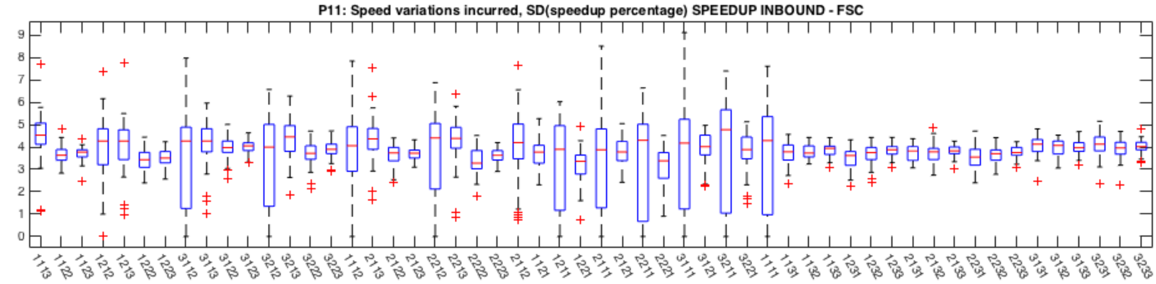
P11: Speed variations incurred, SD(speedup percentage) SPEEDUP - LCC

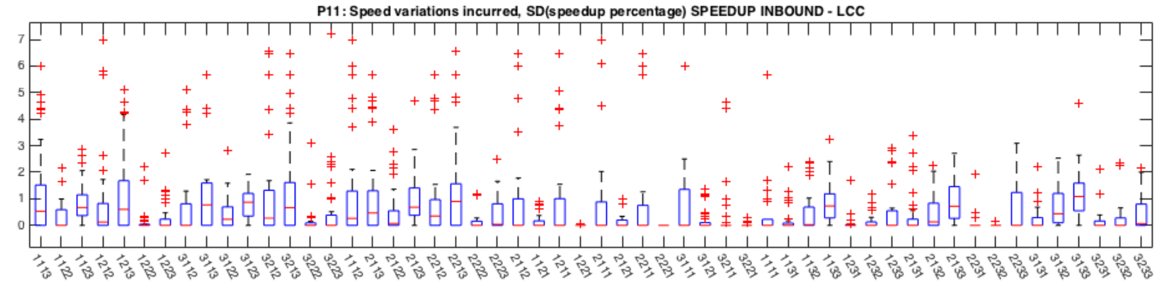


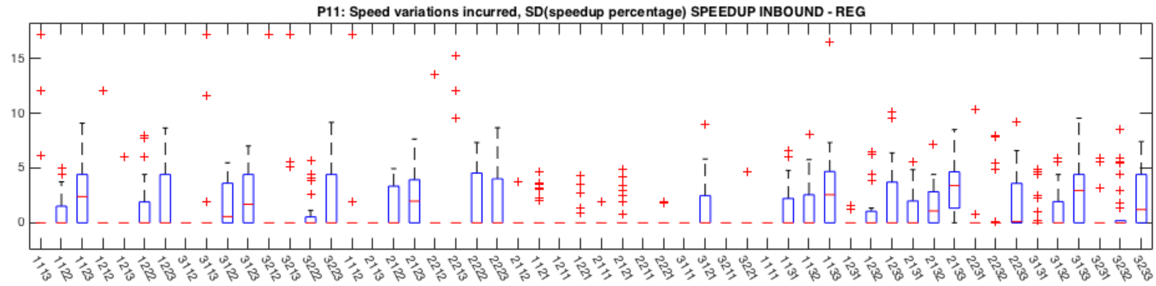
P11: Speed variations incurred, SD(speedup percentage) SPEEDUP - REG

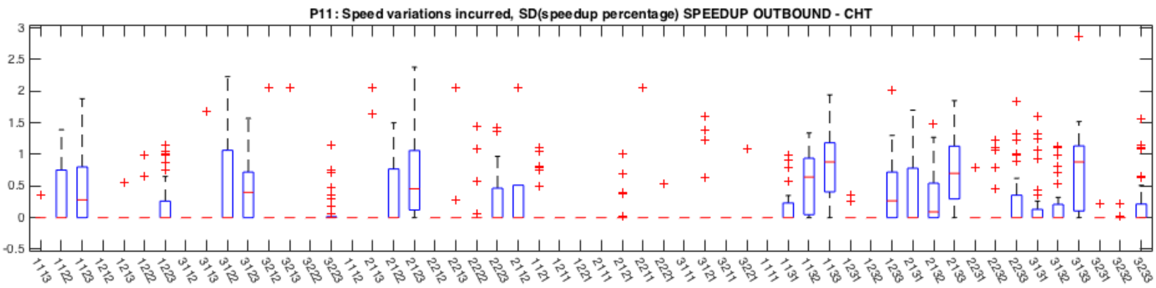


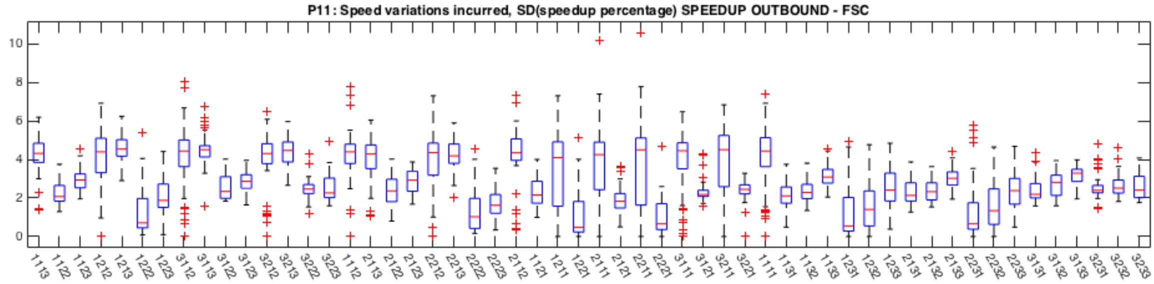

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP INBOUND - CHT

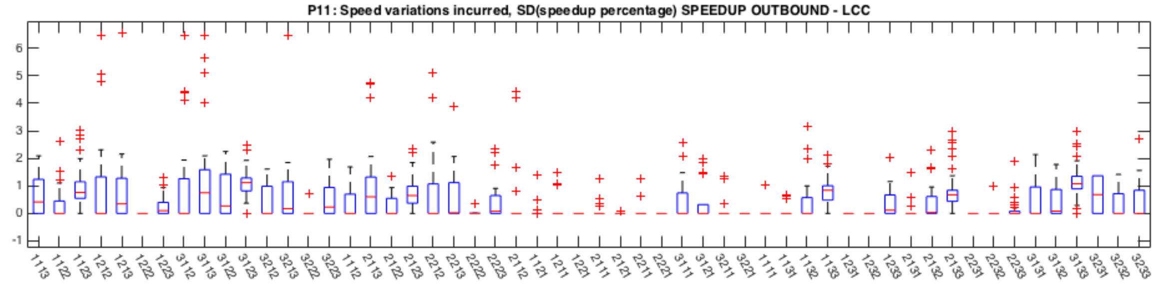

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP INBOUND - FSC

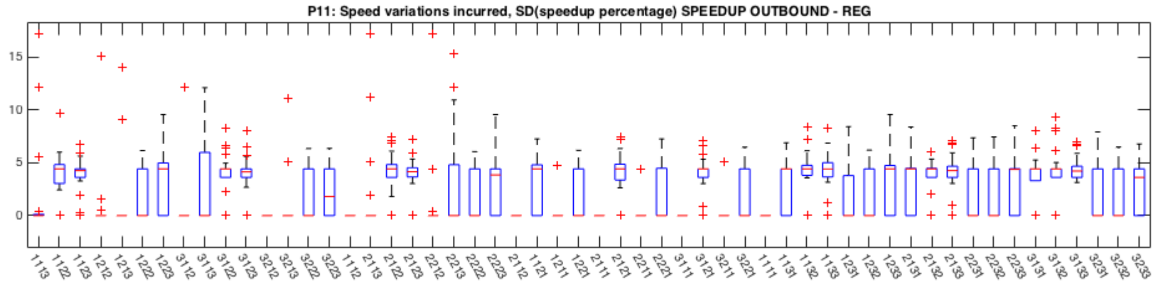

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP INBOUND - LCC

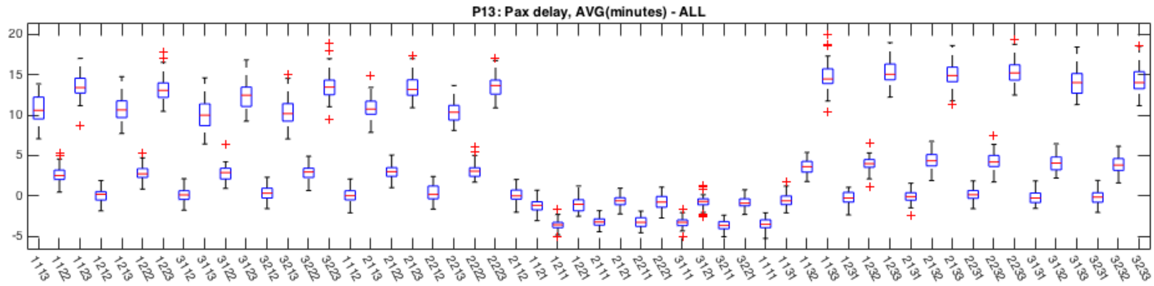

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP INBOUND - REG

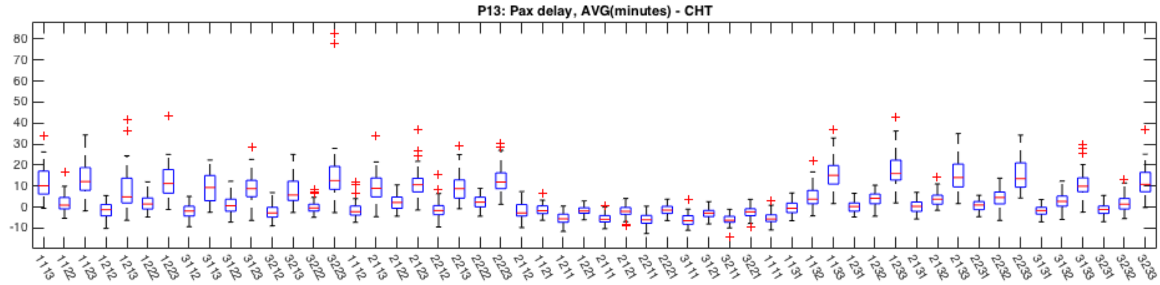

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP OUTBOUND - CHT

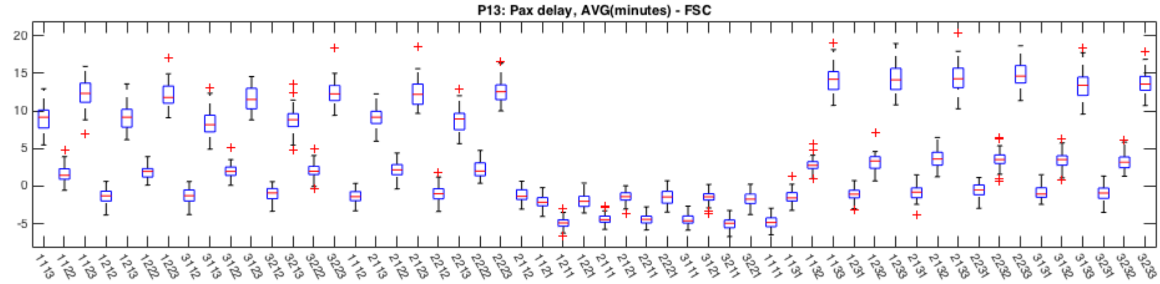

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP OUTBOUND - FSC

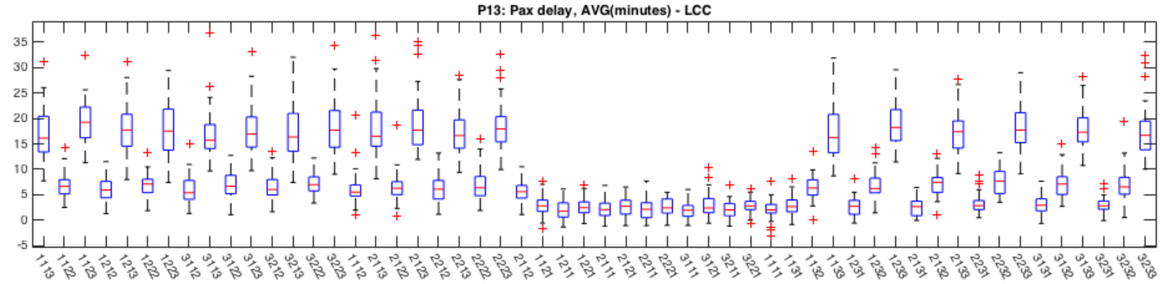

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP OUTBOUND - LCC

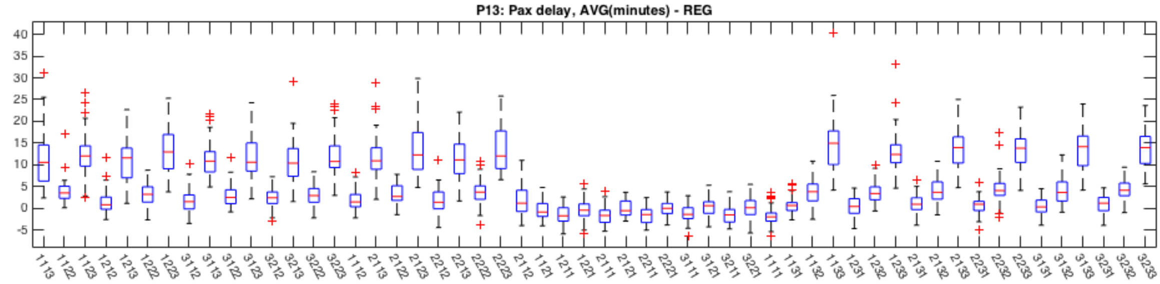

P11: Speed variations incurred, SD(speedup percentage) SPEEDUP OUTBOUND - REG

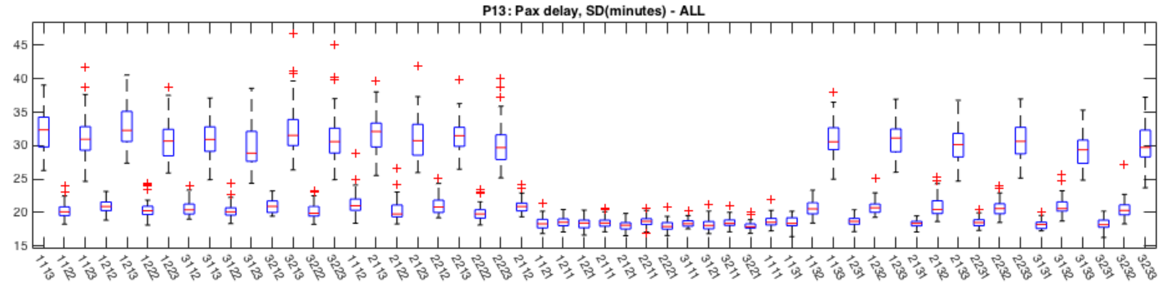

P13: Pax delay, AVG(minutes) - ALL

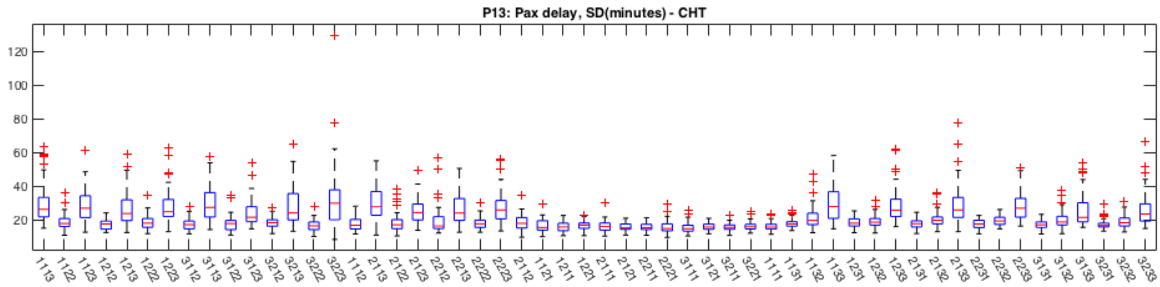

P13: Pax delay, AVG(minutes) - CHT

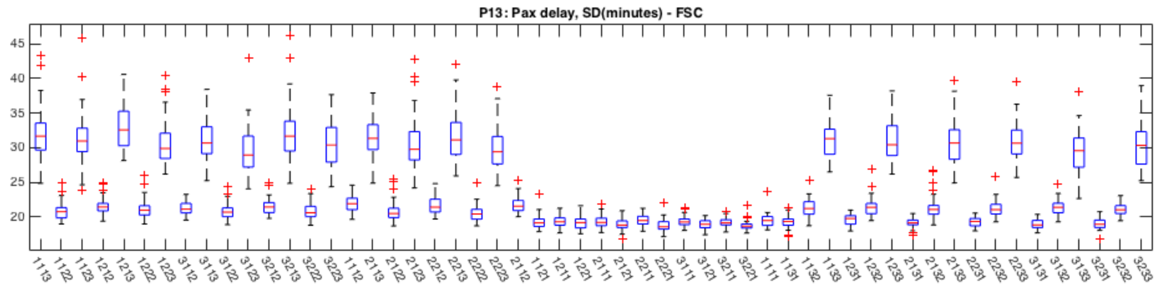

P13: Pax delay, AVG(minutes) - FSC

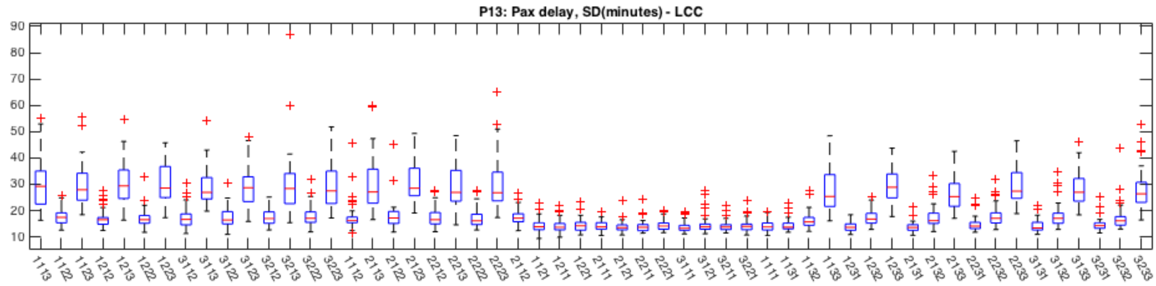

P13: Pax delay, AVG(minutes) - LCC

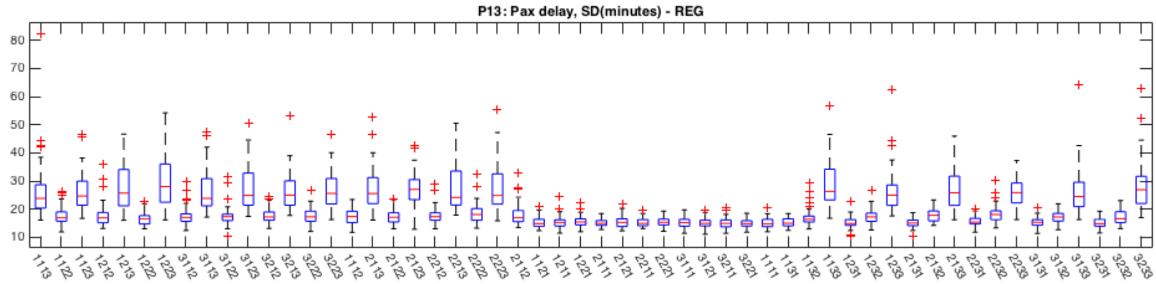

P13: Pax delay, AVG(minutes) - REG

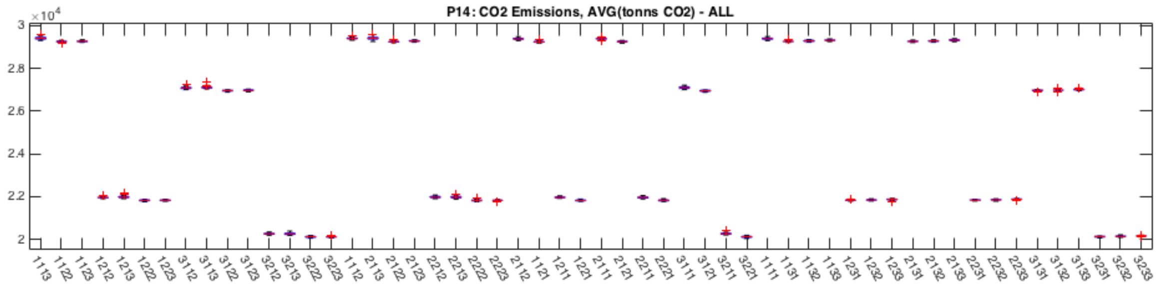

P13: Pax delay, SD(minutes) - ALL

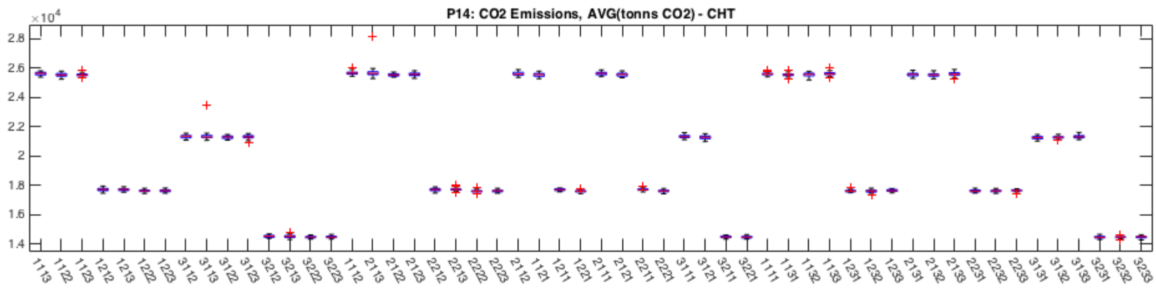

P13: Pax delay, SD(minutes) - CHT

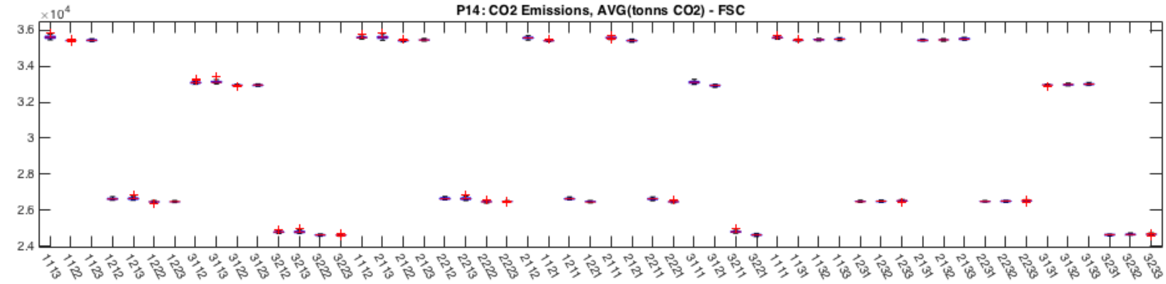

P13: Pax delay, SD(minutes) - FSC

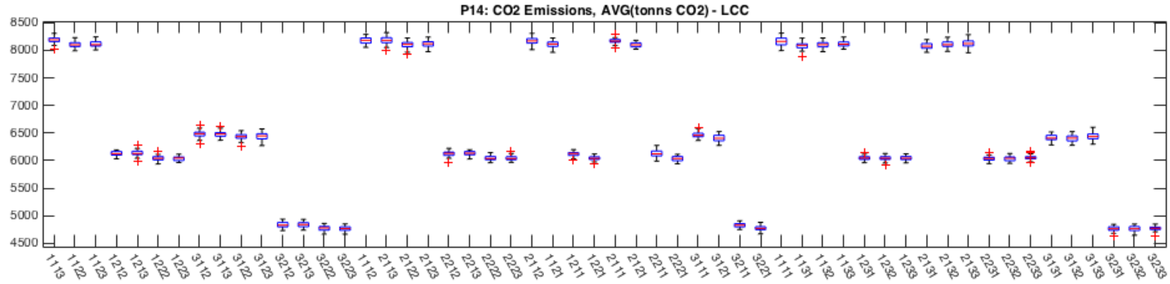

P13: Pax delay, SD(minutes) - LCC

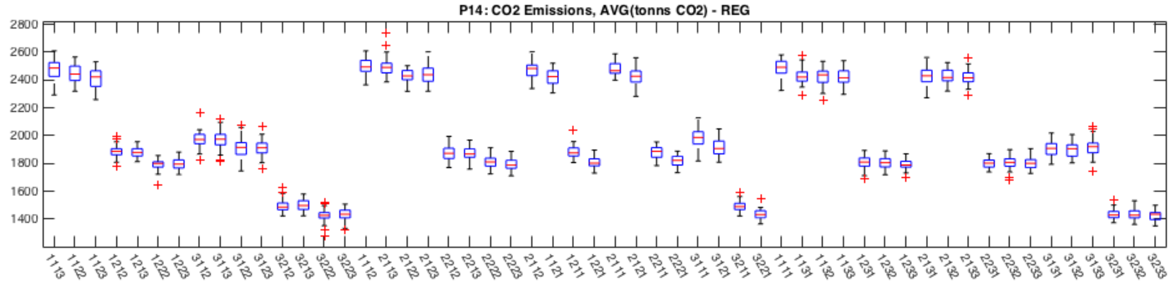

P13: Pax delay, SD(minutes) - REG

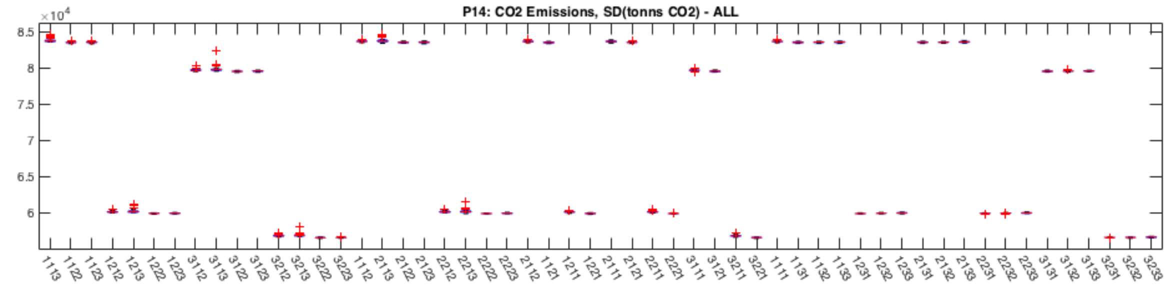

P14: CO2 Emissions, AVG(tonns CO2) - ALL

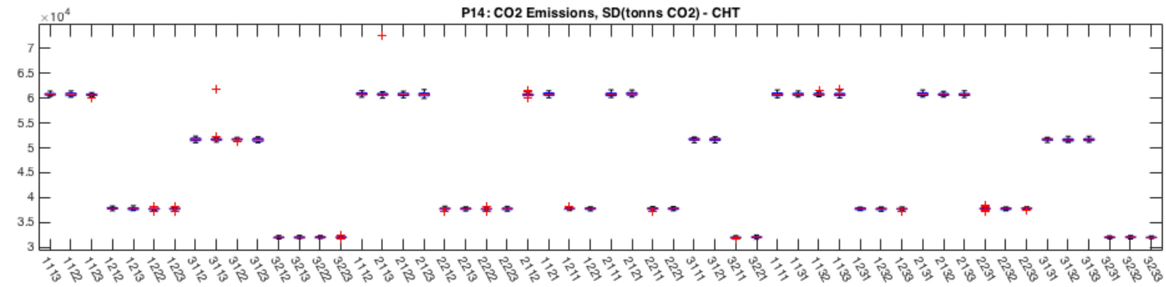

P14: CO2 Emissions, AVG(tonns CO2) - CHT

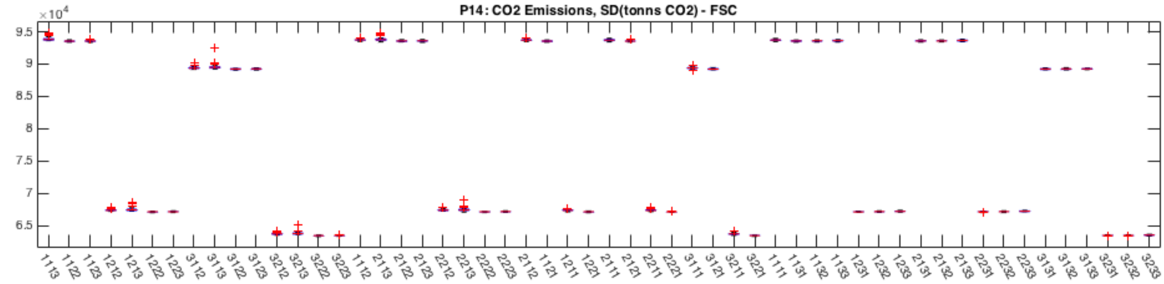

P14: CO2 Emissions, AVG(tonns CO2) - FSC

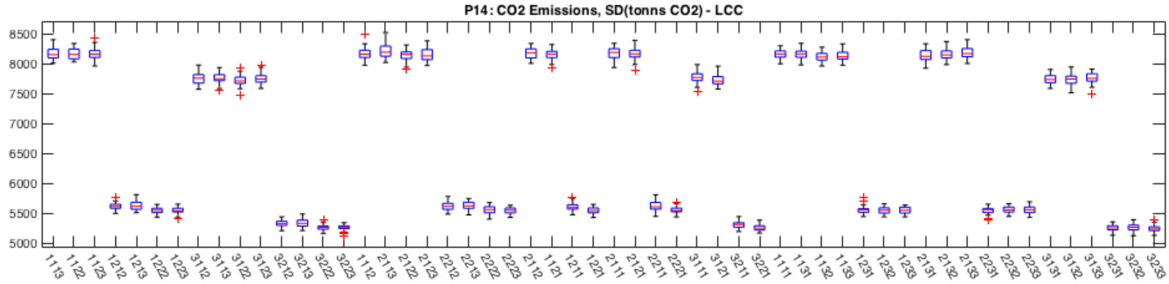

P14: CO2 Emissions, AVG(tonns CO2) - LCC

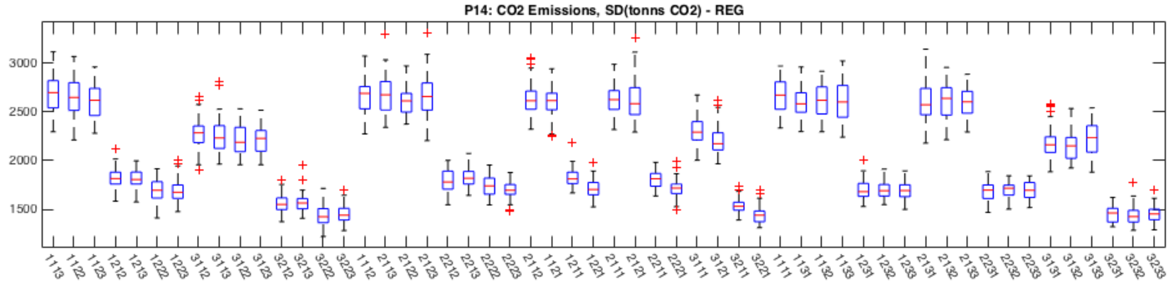

P14: CO2 Emissions, AVG(tonns CO2) - REG

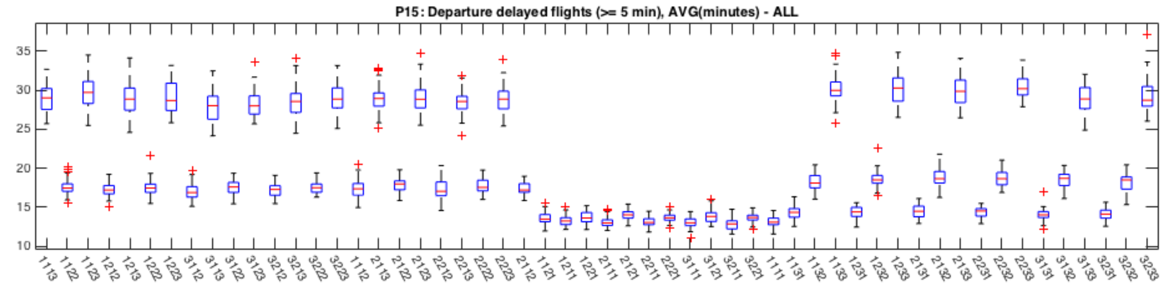

P14: CO2 Emissions, SD(tonns CO2) - ALL

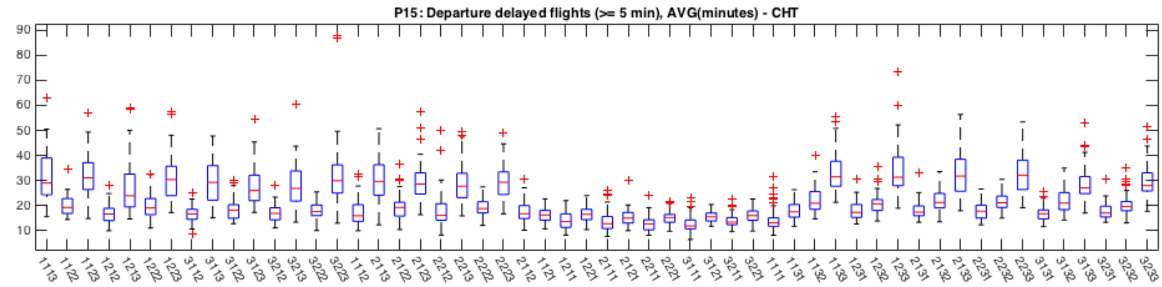

P14: CO2 Emissions, SD(tonns CO2) - CHT


P14: CO2 Emissions, SD(tonns CO2) - FSC

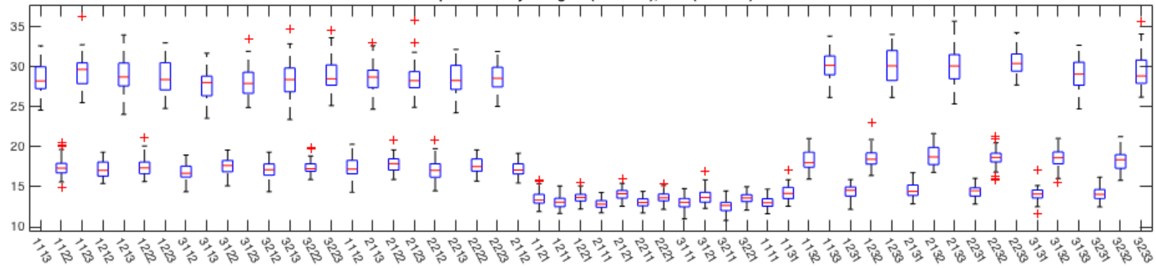

P14: CO2 Emissions, SD(tonns CO2) - LCC


P14: CO2 Emissions, SD(tonns CO2) - REG

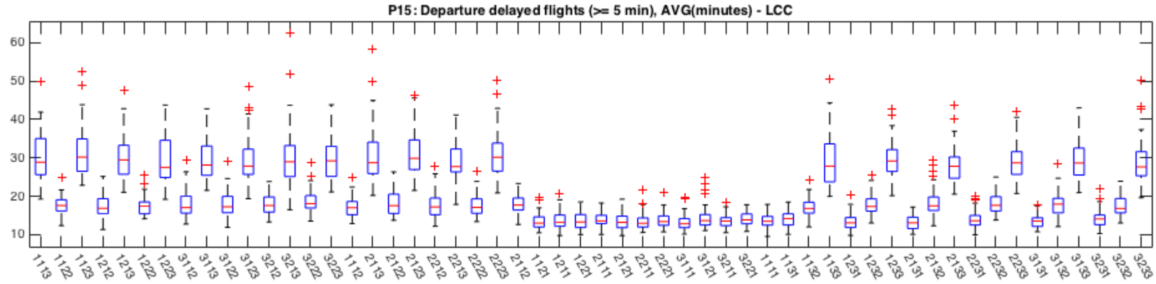

P15: Departure delayed flights (>= 5 min), AVG(minutes) - ALL


P15: Departure delayed flights (>= 5 min), AVG(minutes) - CHT

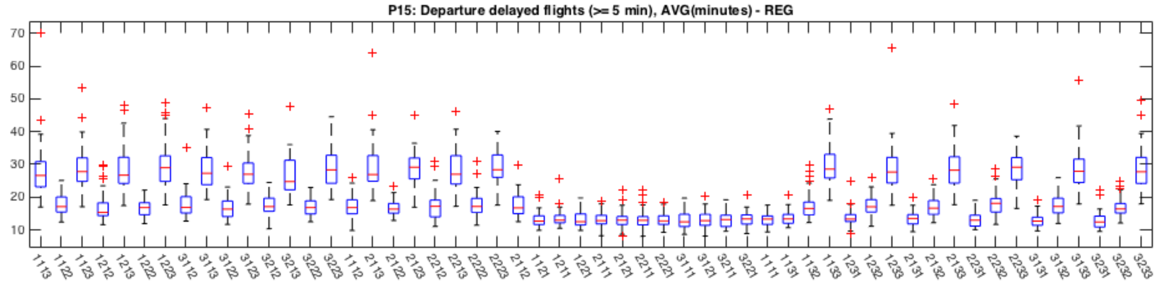
P15: Departure delayed flights (>= 5 min), AVG(minutes) - FSC



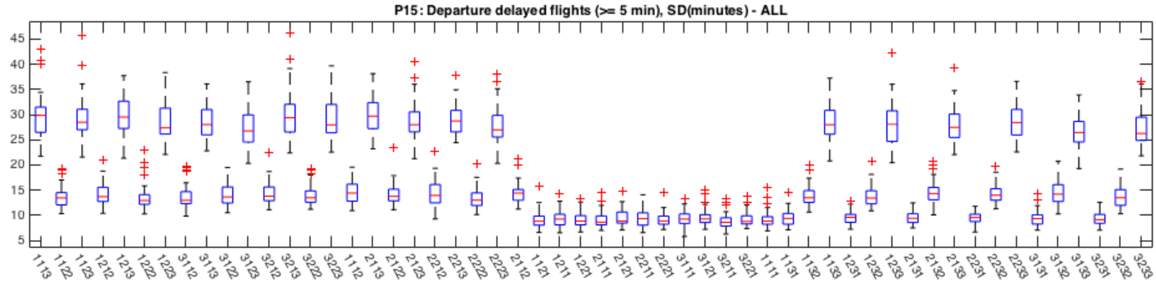
P15: Departure delayed flights (>= 5 min), AVG(minutes) - LCC



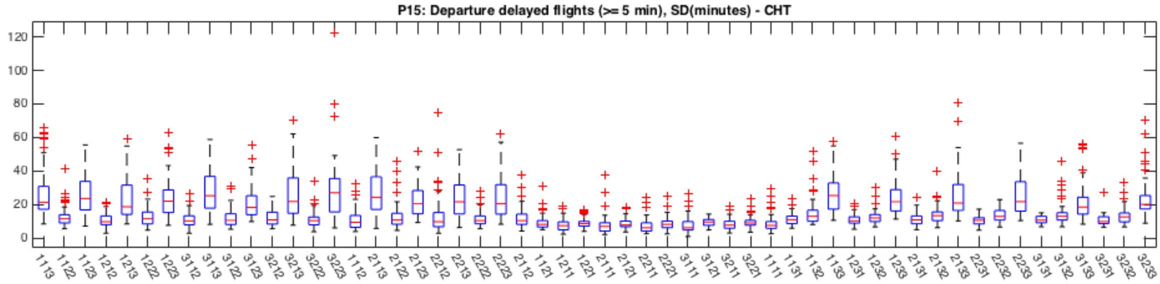
P15: Departure delayed flights (>= 5 min), AVG(minutes) - REG

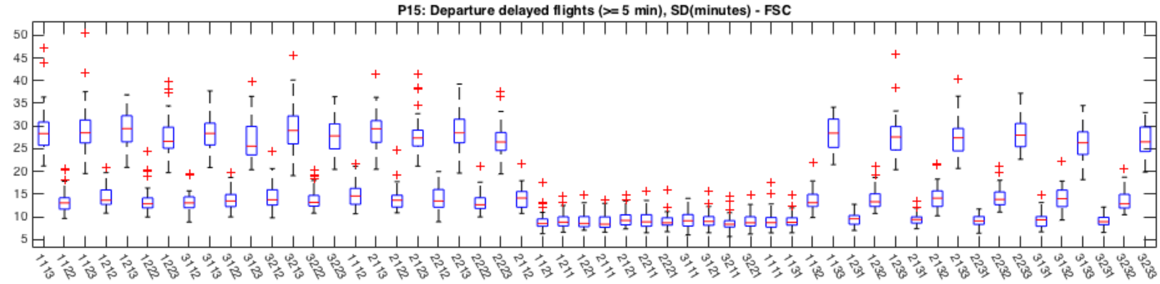


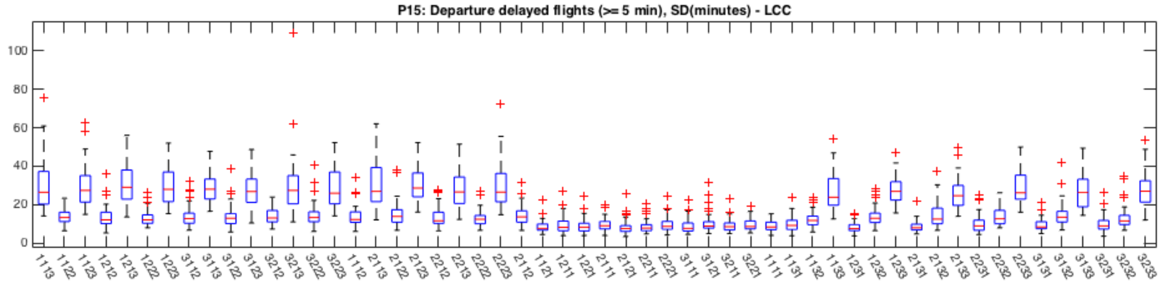
P15: Departure delayed flights (>= 5 min), SD(minutes) - ALL

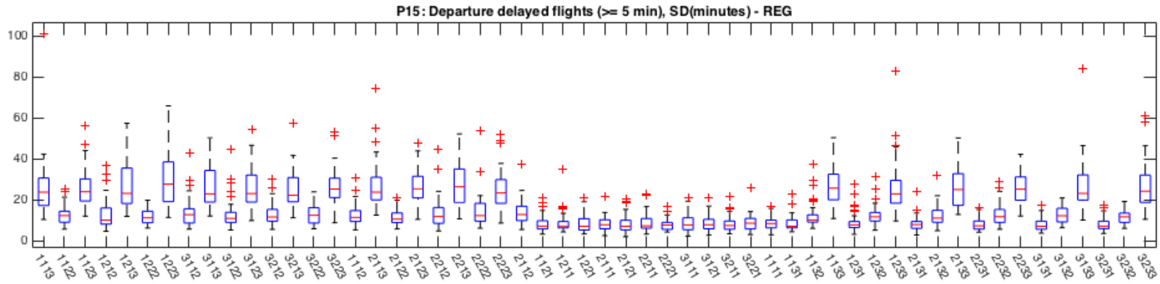


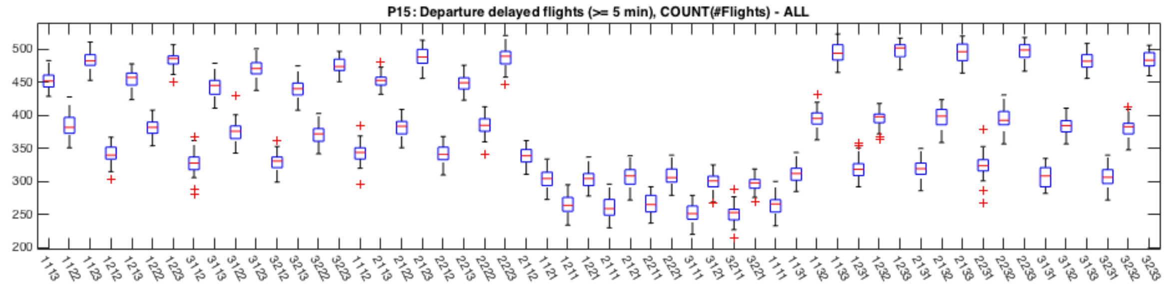
P15: Departure delayed flights (>= 5 min), SD(minutes) - CHT

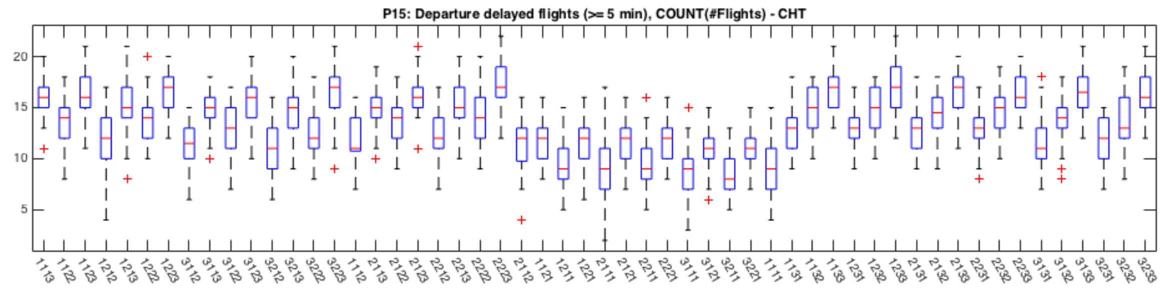


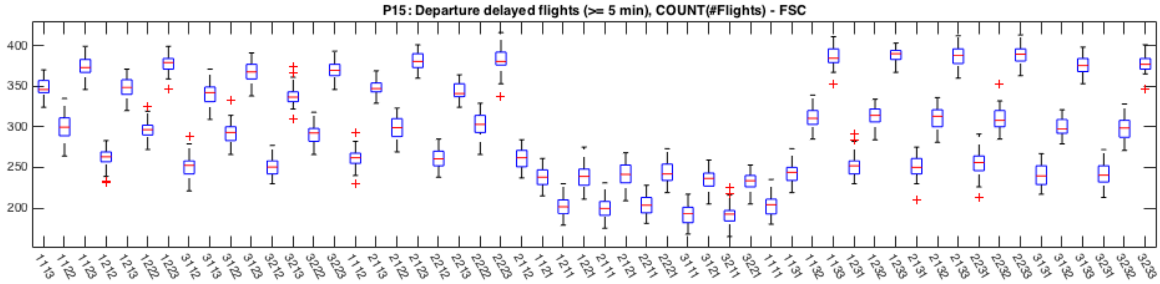

P15: Departure delayed flights (>= 5 min), SD(minutes) - FSC

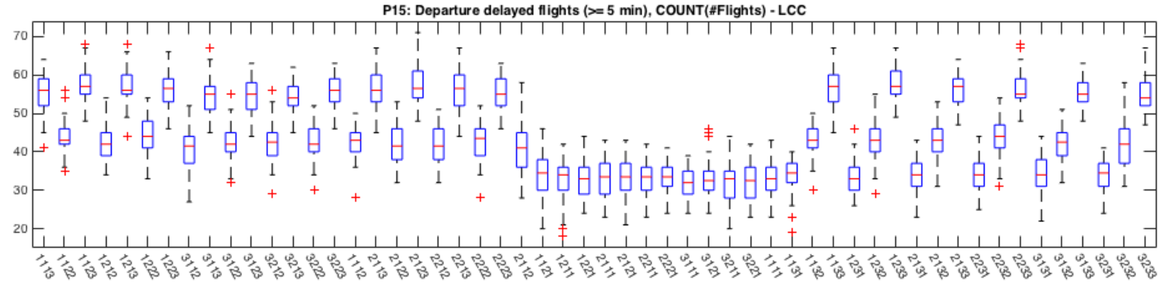

P15: Departure delayed flights (>= 5 min), SD(minutes) - LCC

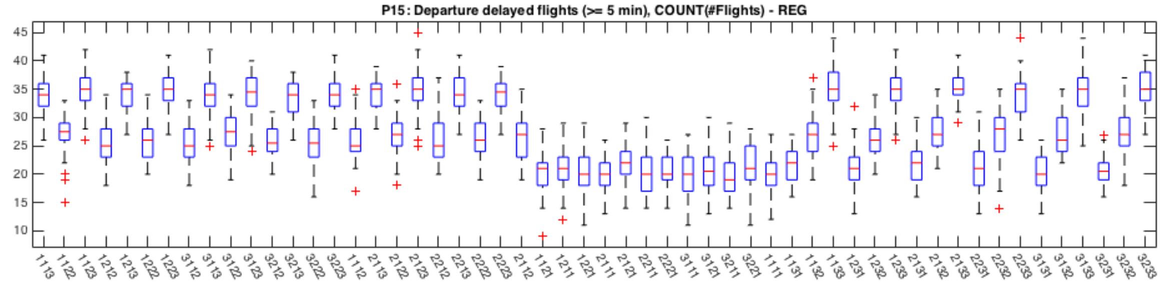

P15: Departure delayed flights (>= 5 min), SD(minutes) - REG

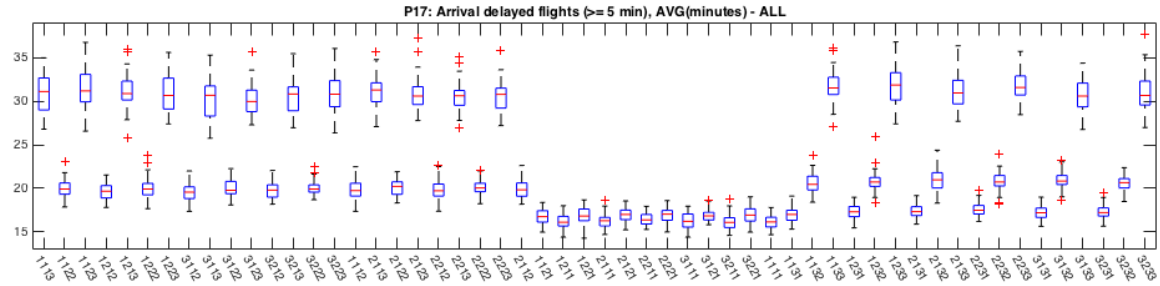

P15: Departure delayed flights (>= 5 min), COUNT(#Flights) - ALL

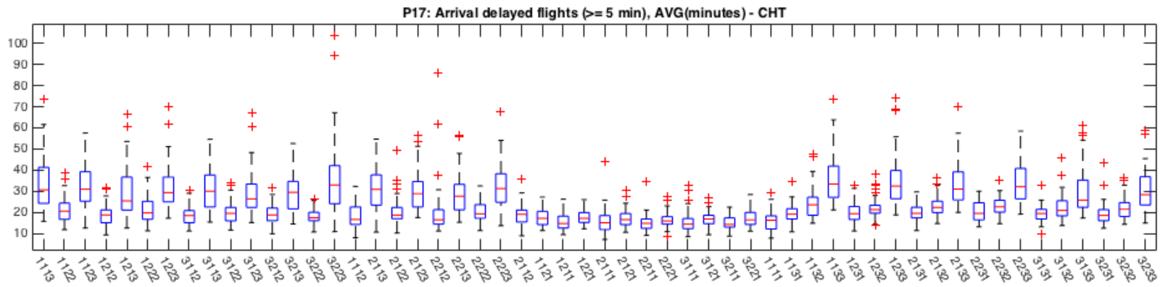

P15: Departure delayed flights (>= 5 min), COUNT(#Flights) - CHT


P15: Departure delayed flights (>= 5 min), COUNT(#Flights) - FSC

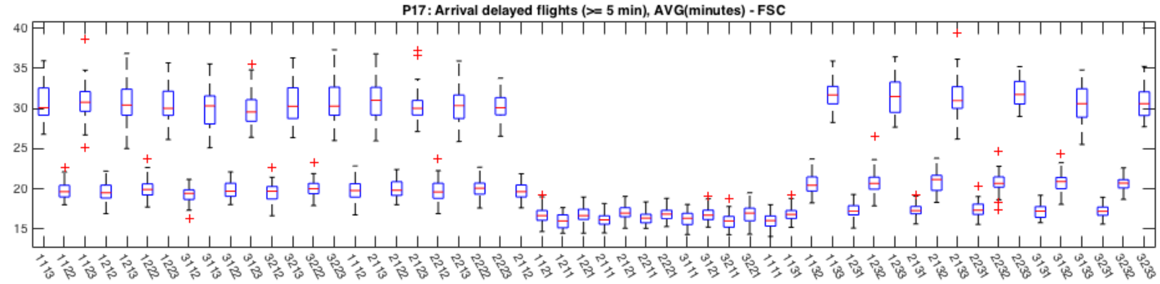

P15: Departure delayed flights (>= 5 min), COUNT(#Flights) - LCC


P15: Departure delayed flights (>= 5 min), COUNT(#Flights) - REG

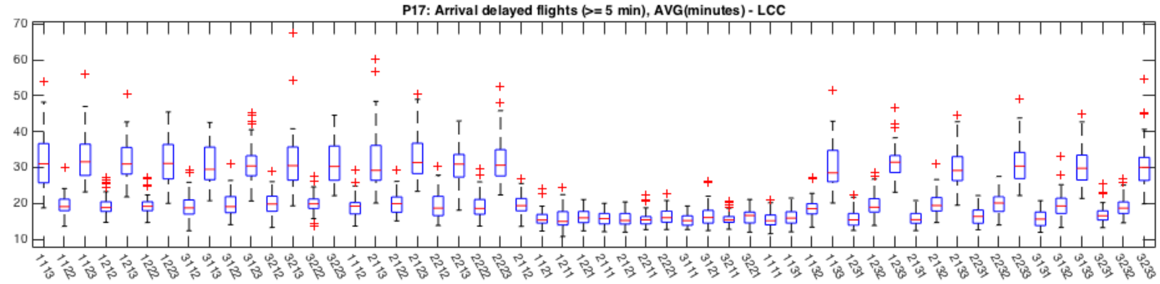

P17: Arrival delayed flights (>= 5 min), AVG(minutes) - ALL


P17: Arrival delayed flights (>= 5 min), AVG(minutes) - CHT

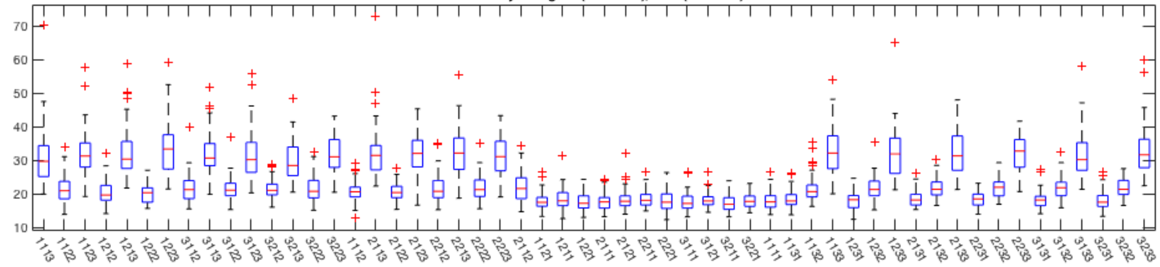
P17: Arrival delayed flights (>= 5 min), AVG(minutes) - FSC



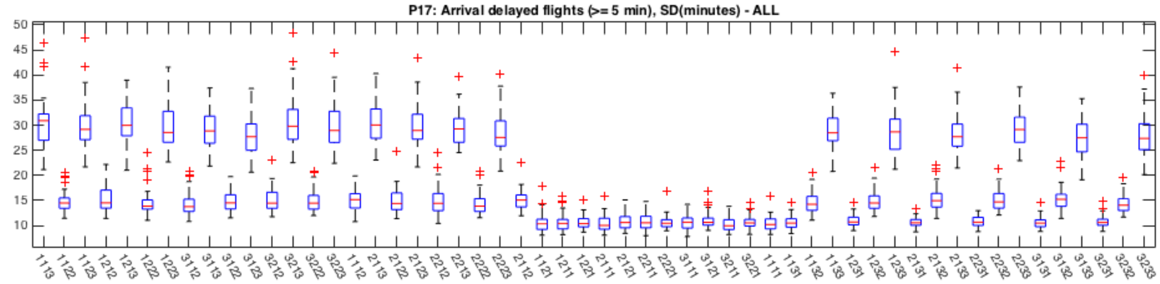
P17: Arrival delayed flights (>= 5 min), AVG(minutes) - LCC



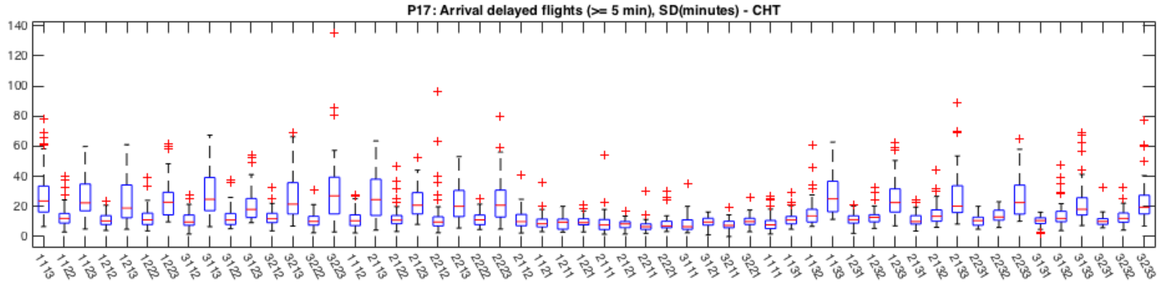
P17: Arrival delayed flights (>= 5 min), AVG(minutes) - REG

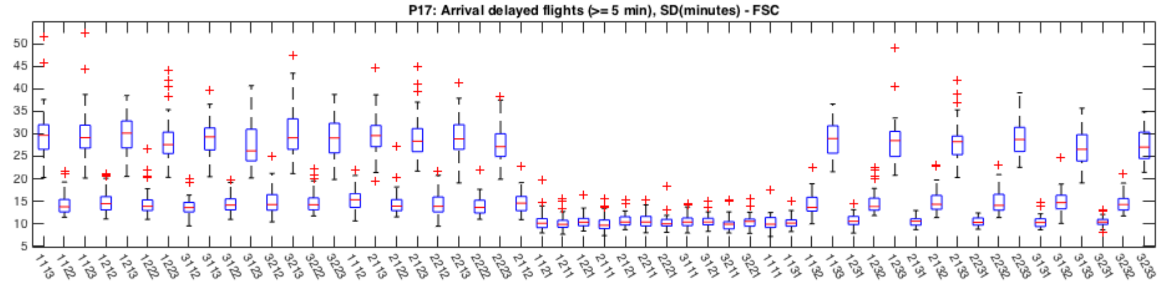


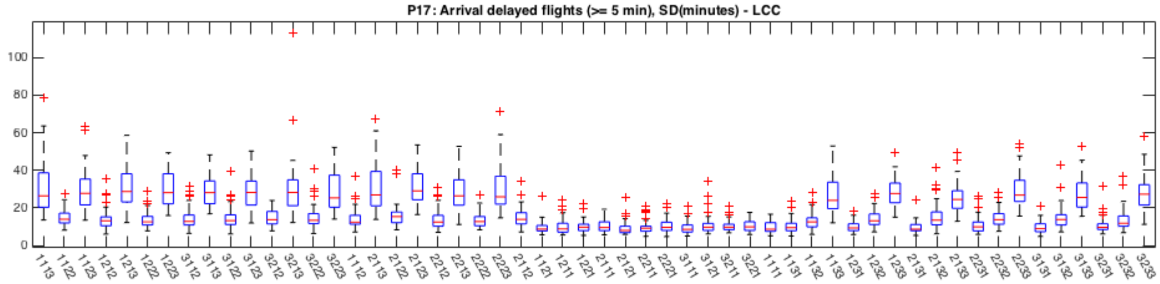
P17: Arrival delayed flights (>= 5 min), SD(minutes) - ALL

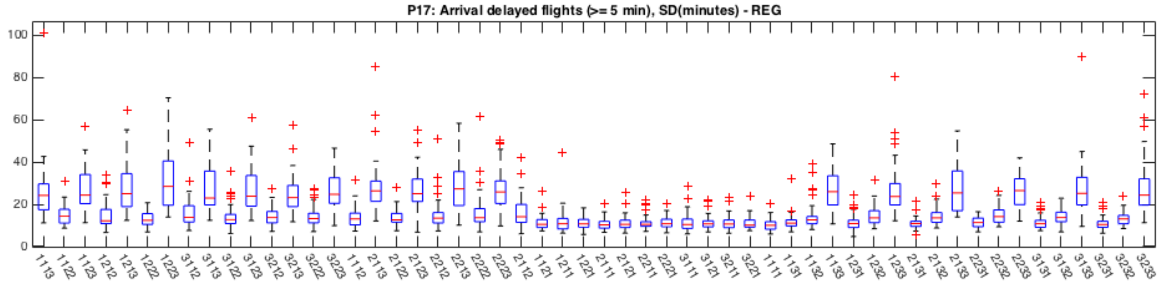


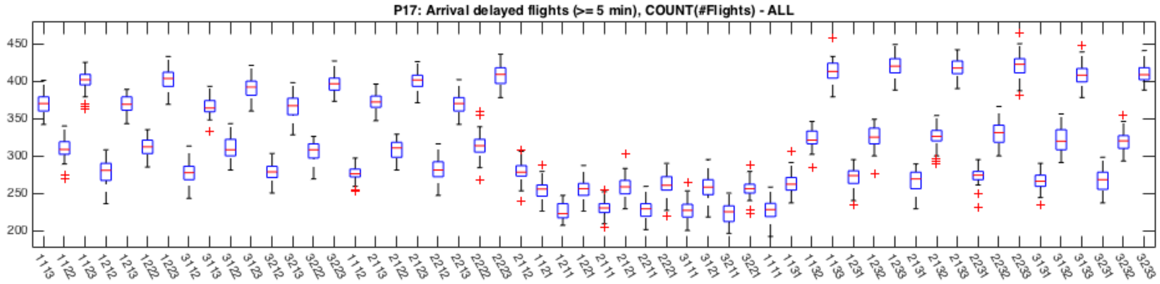
P17: Arrival delayed flights (>= 5 min), SD(minutes) - CHT

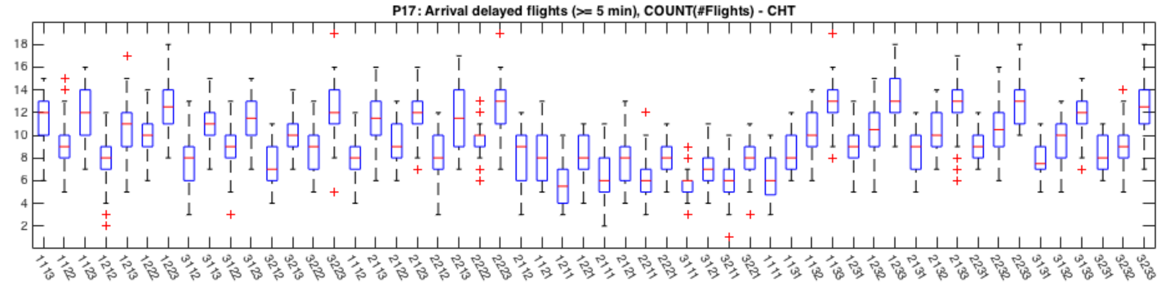


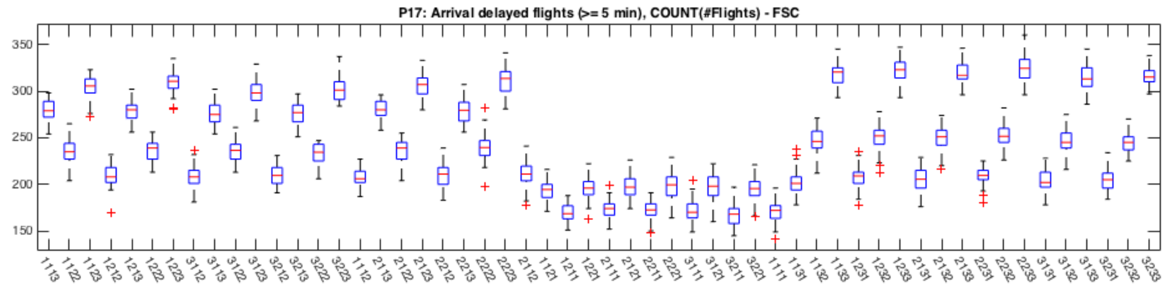

P17: Arrival delayed flights (>= 5 min), SD(minutes) - FSC

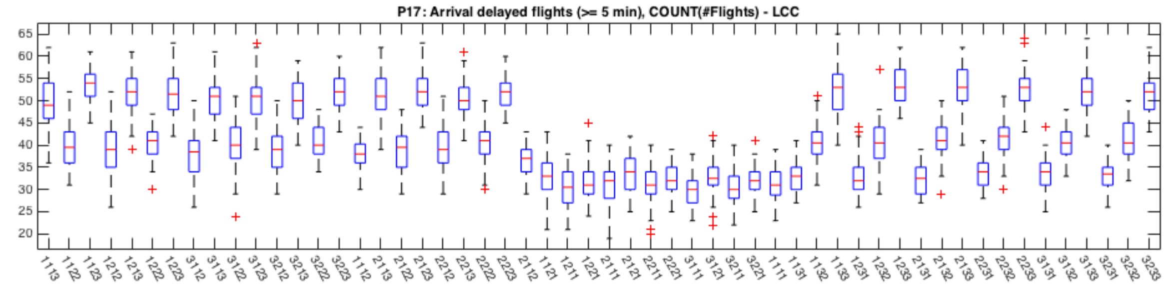

P17: Arrival delayed flights (>= 5 min), SD(minutes) - LCC

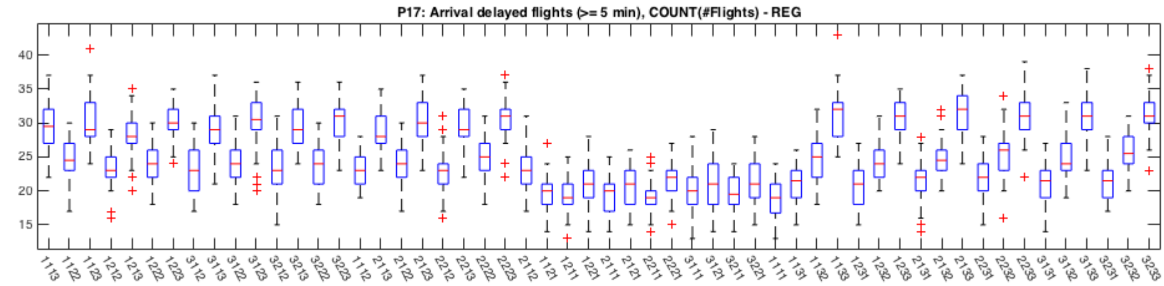

P17: Arrival delayed flights (>= 5 min), SD(minutes) - REG

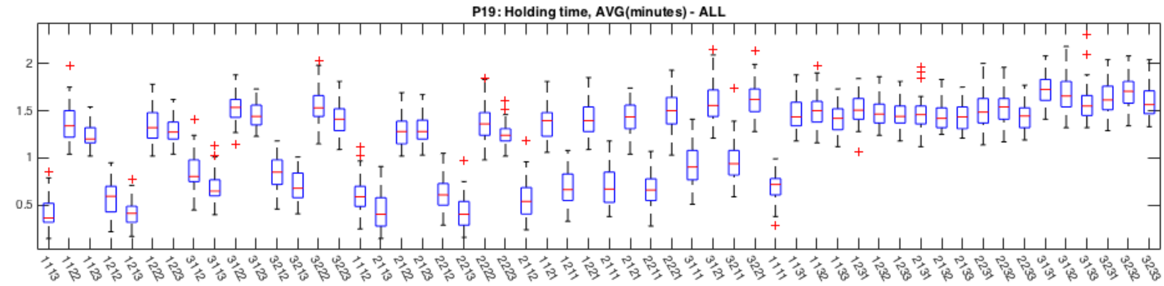

P17: Arrival delayed flights (>= 5 min), COUNT(#Flights) - ALL

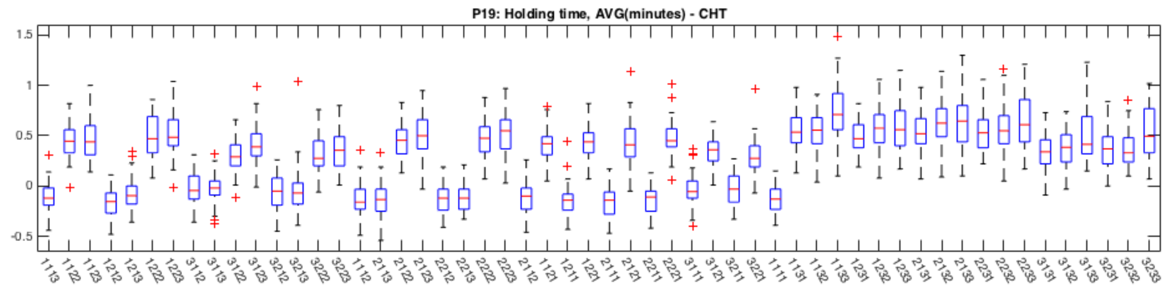

P17: Arrival delayed flights (>= 5 min), COUNT(#Flights) - CHT

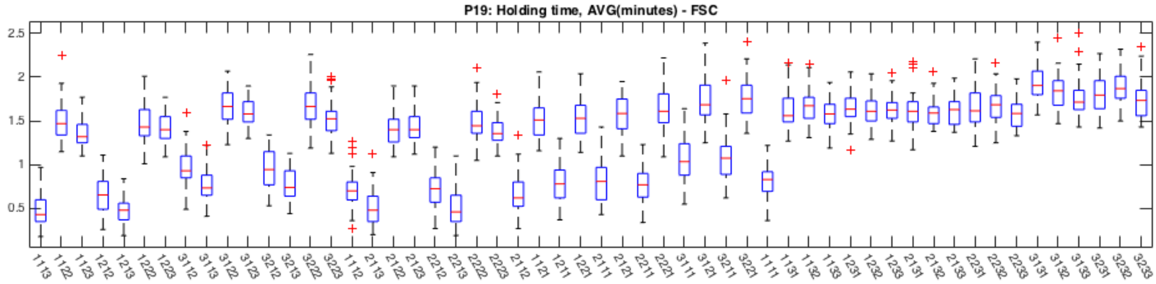

P17: Arrival delayed flights (>= 5 min), COUNT(#Flights) - FSC

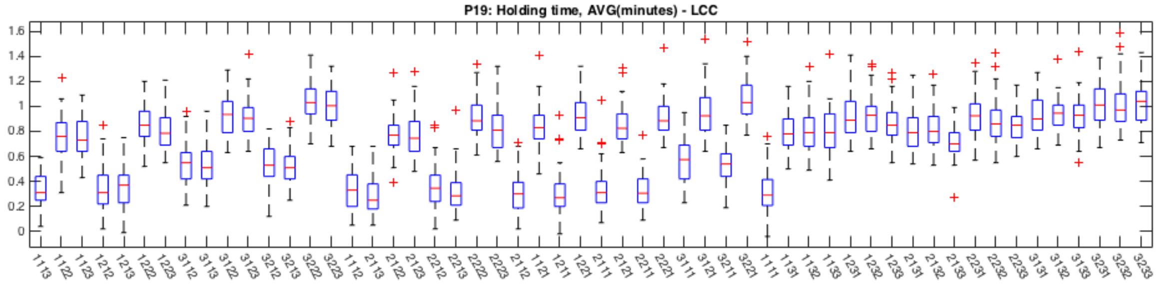

P17: Arrival delayed flights (>= 5 min), COUNT(#Flights) - LCC

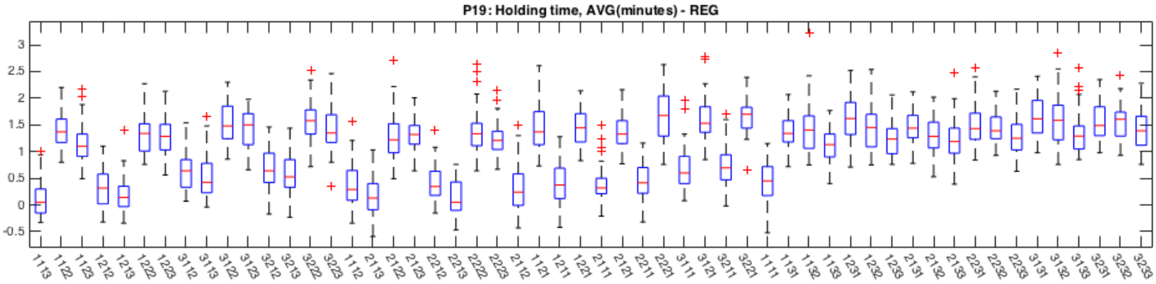

P17: Arrival delayed flights (>= 5 min), COUNT(#Flights) - REG

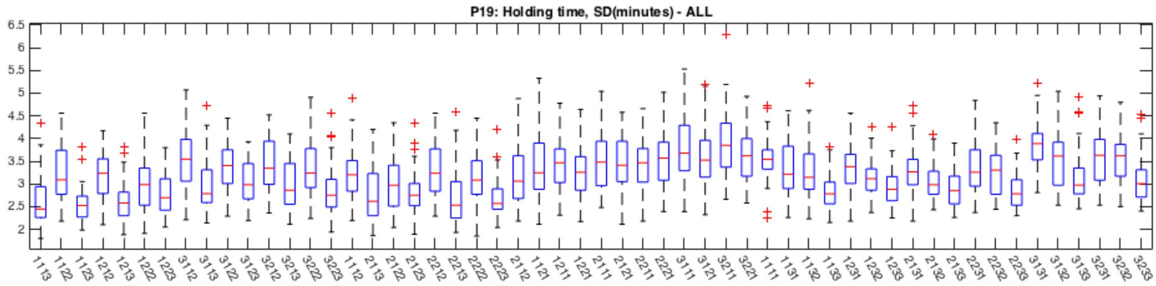

P19: Holding time, AVG(minutes) - ALL

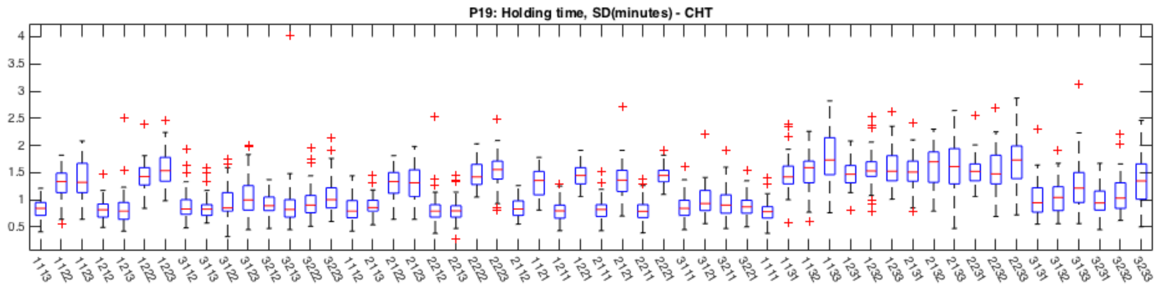

P19: Holding time, AVG(minutes) - CHT

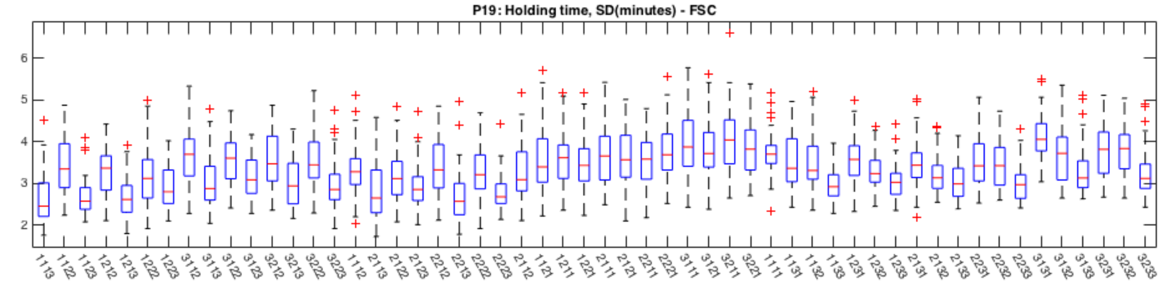

P19: Holding time, AVG(minutes) - FSC

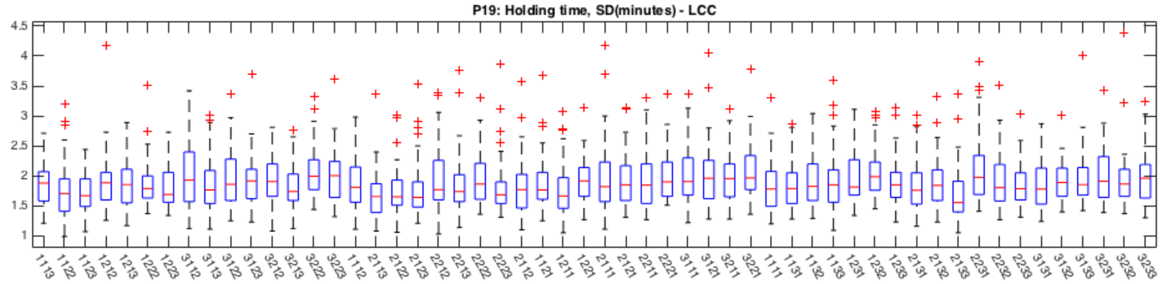

P19: Holding time, AVG(minutes) - LCC

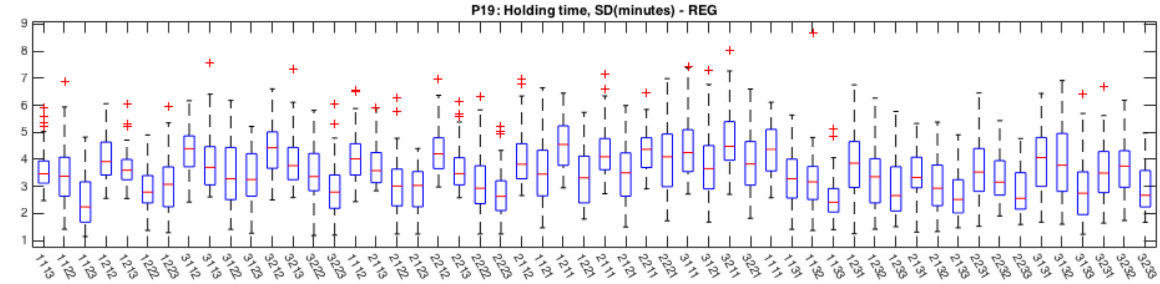

P19: Holding time, AVG(minutes) - REG

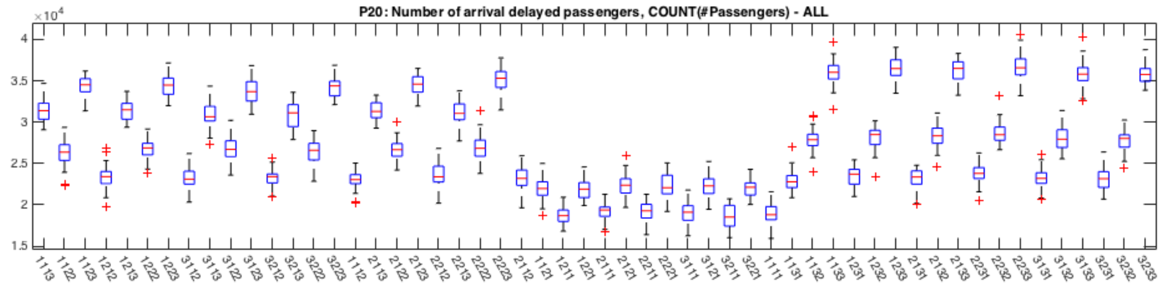

P19: Holding time, SD(minutes) - ALL

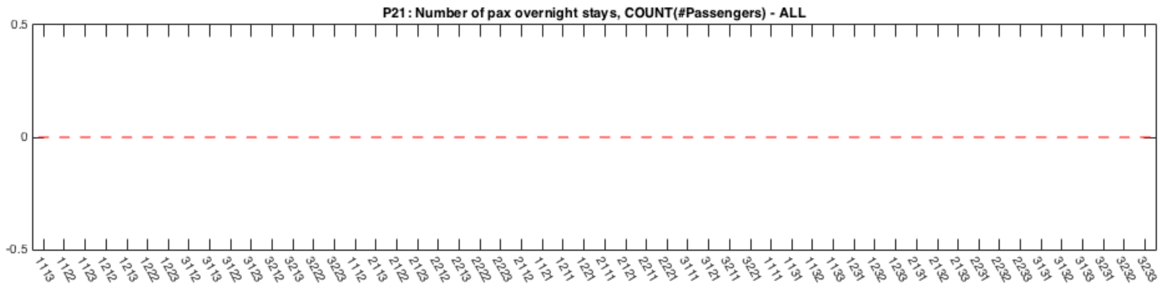

P19: Holding time, SD(minutes) - CHT

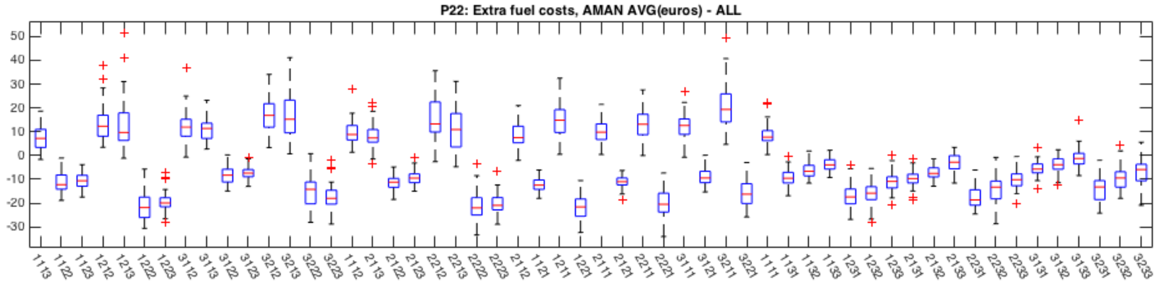

P19: Holding time, SD(minutes) - FSC

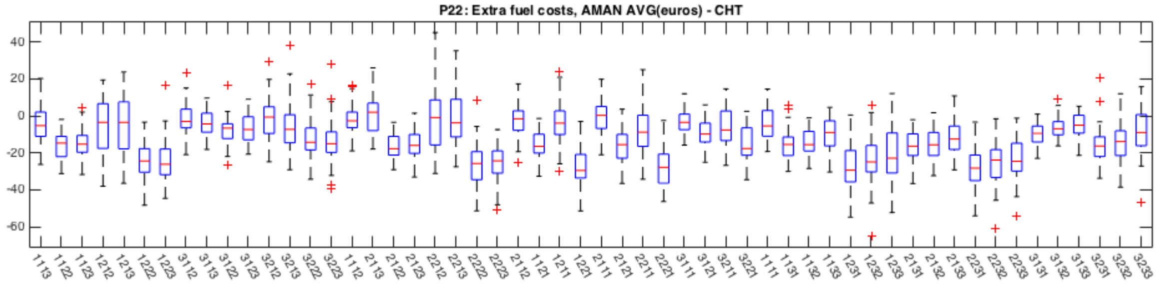

P19: Holding time, SD(minutes) - LCC

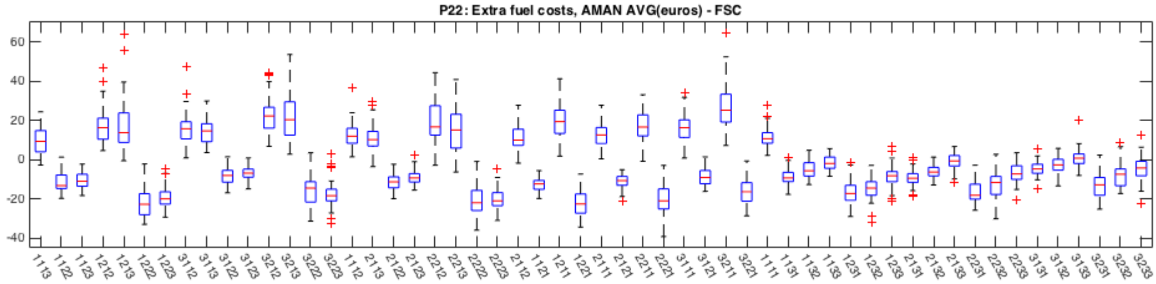

P19: Holding time, SD(minutes) - REG

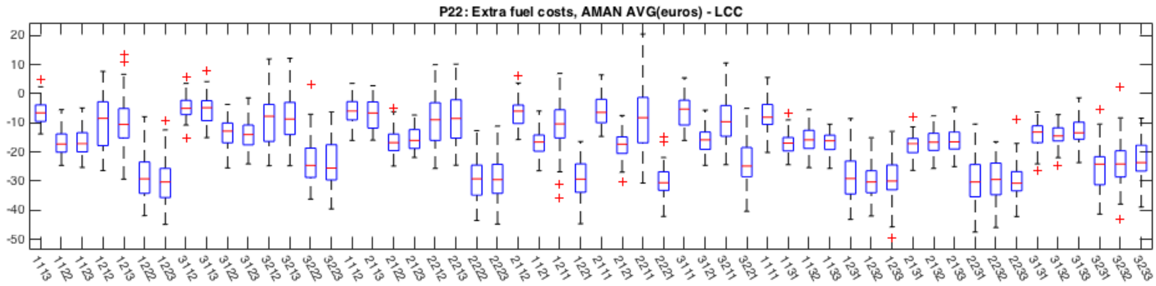

P20: Number of arrival delayed passengers, COUNT(#Passengers) - ALL

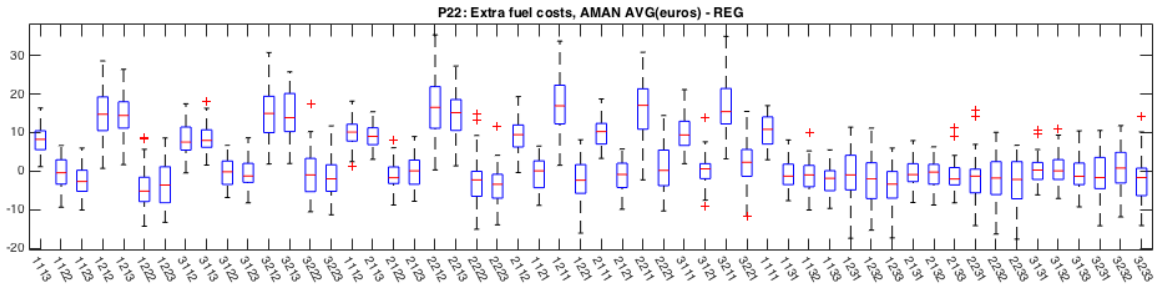

P21: Number of pax overnight stays, COUNT(#Passengers) - ALL

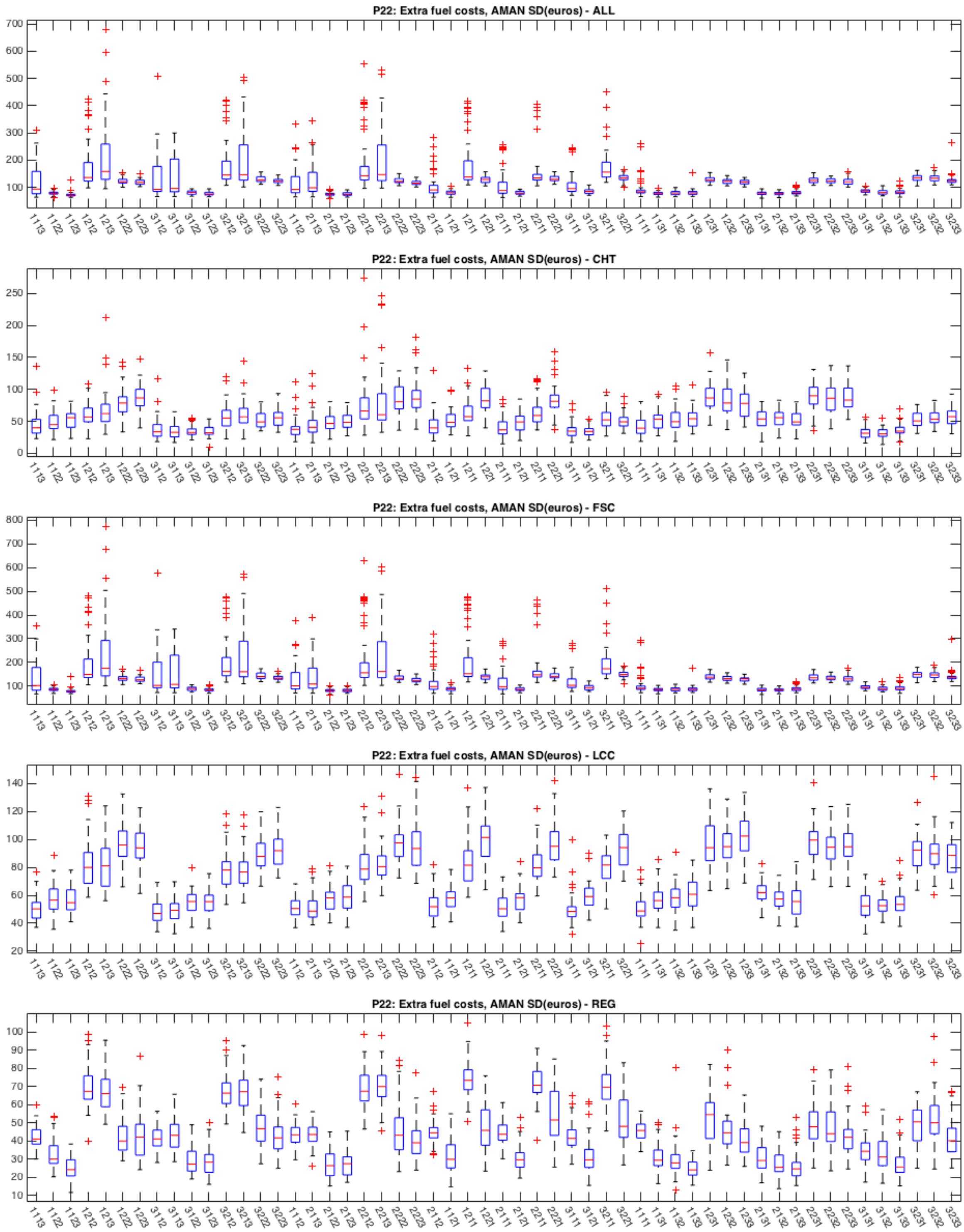

P22: Extra fuel costs, AMAN AVG(euros) - ALL

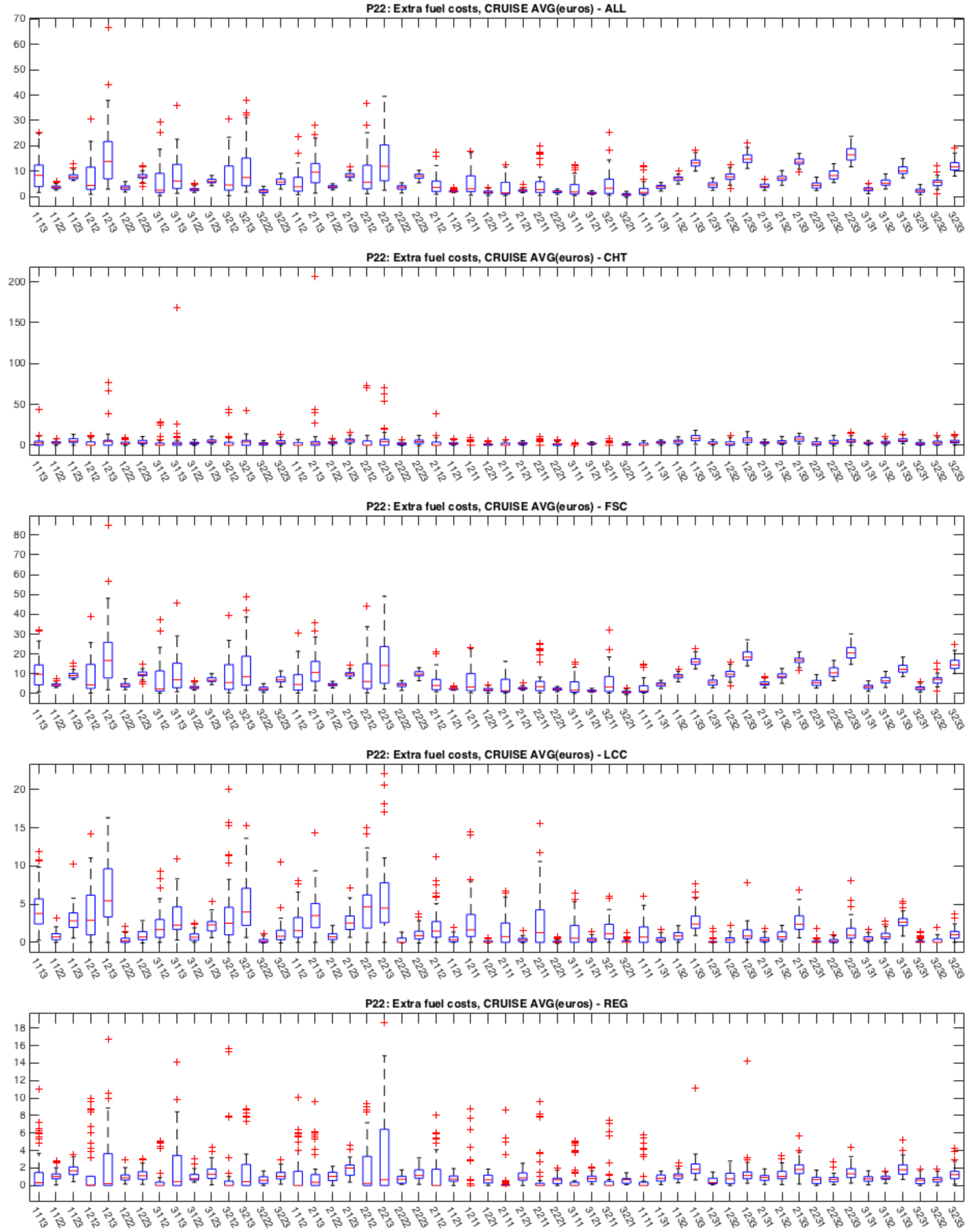

P22: Extra fuel costs, AMAN AVG(euros) - CHT

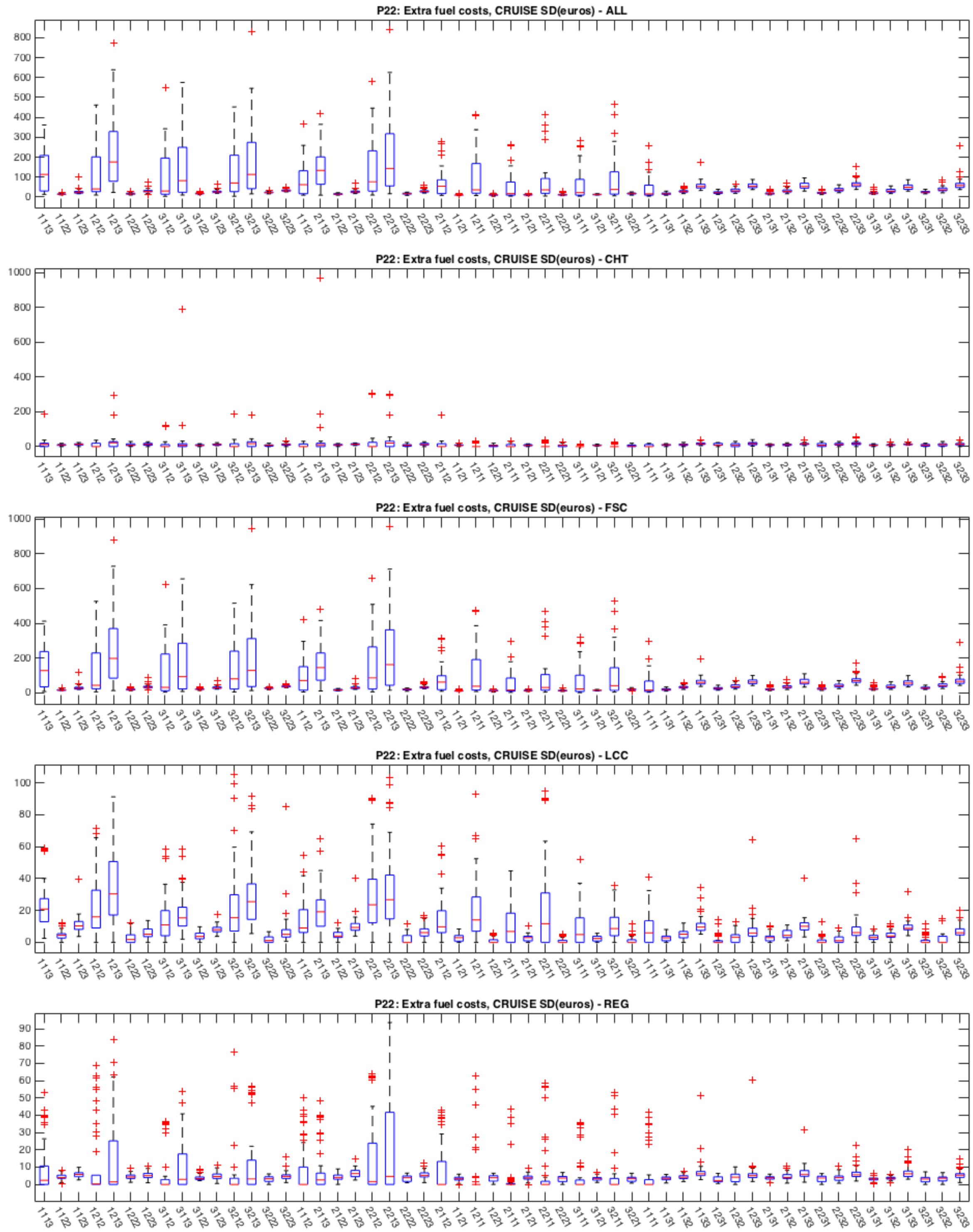

P22: Extra fuel costs, AMAN AVG(euros) - FSC

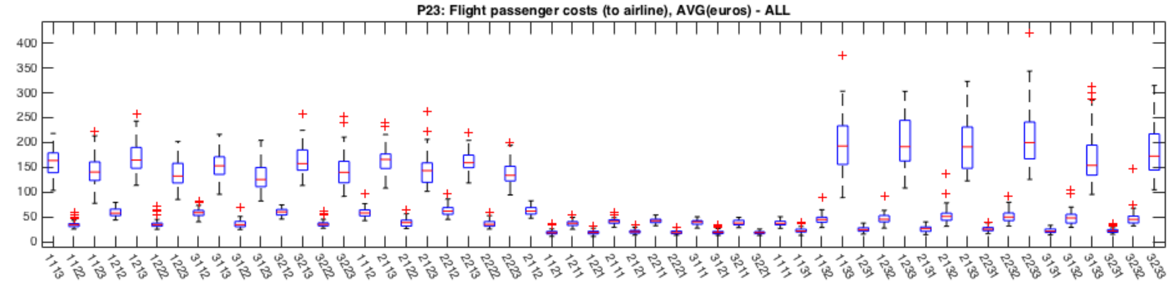

P22: Extra fuel costs, AMAN AVG(euros) - LCC

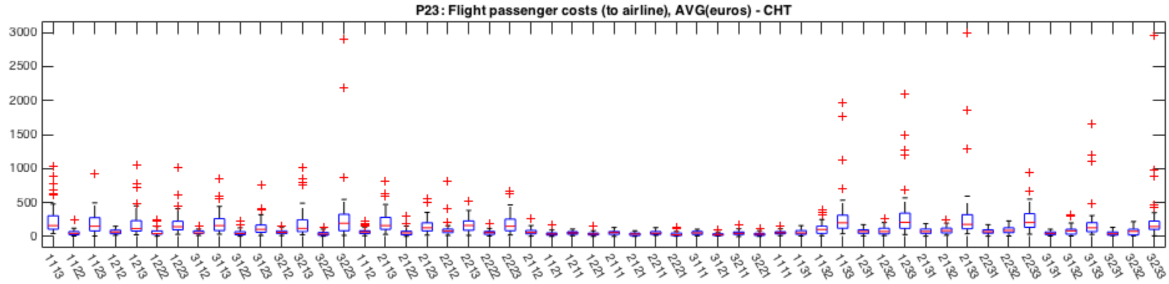

P22: Extra fuel costs, AMAN AVG(euros) - REG

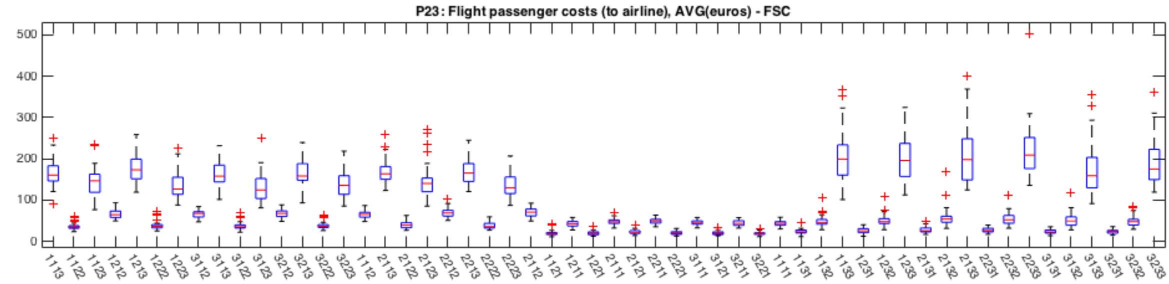

P22: Extra fuel costs, AMAN SD(euros) - ALL
P22: Extra fuel costs, AMAN SD(euros) - CHT
P22: Extra fuel costs, AMAN SD(euros) - FSC
P22: Extra fuel costs, AMAN SD(euros) - LCC
P22: Extra fuel costs, AMAN SD(euros) - REG

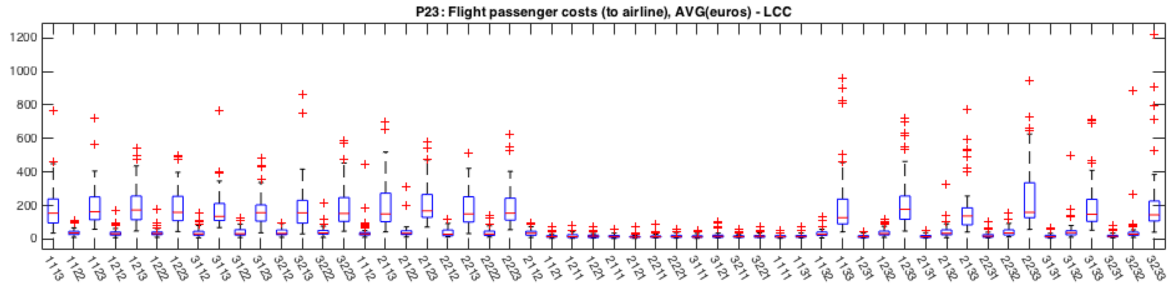

P22: Extra fuel costs, CRUISE AVG(euros) - ALL
P22: Extra fuel costs, CRUISE AVG(euros) - CHT
P22: Extra fuel costs, CRUISE AVG(euros) - FSC
P22: Extra fuel costs, CRUISE AVG(euros) - LCC
P22: Extra fuel costs, CRUISE AVG(euros) - REG

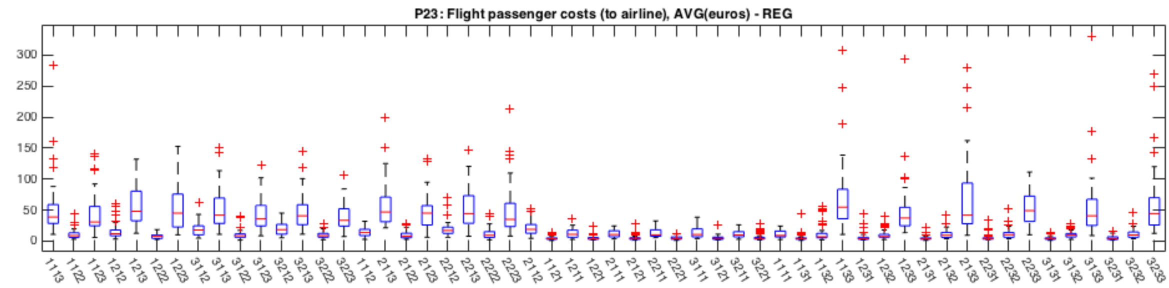

P22: Extra fuel costs, CRUISE SD(euros) - ALL
P22: Extra fuel costs, CRUISE SD(euros) - CHT
P22: Extra fuel costs, CRUISE SD(euros) - FSC
P22: Extra fuel costs, CRUISE SD(euros) - LCC
P22: Extra fuel costs, CRUISE SD(euros) - REG

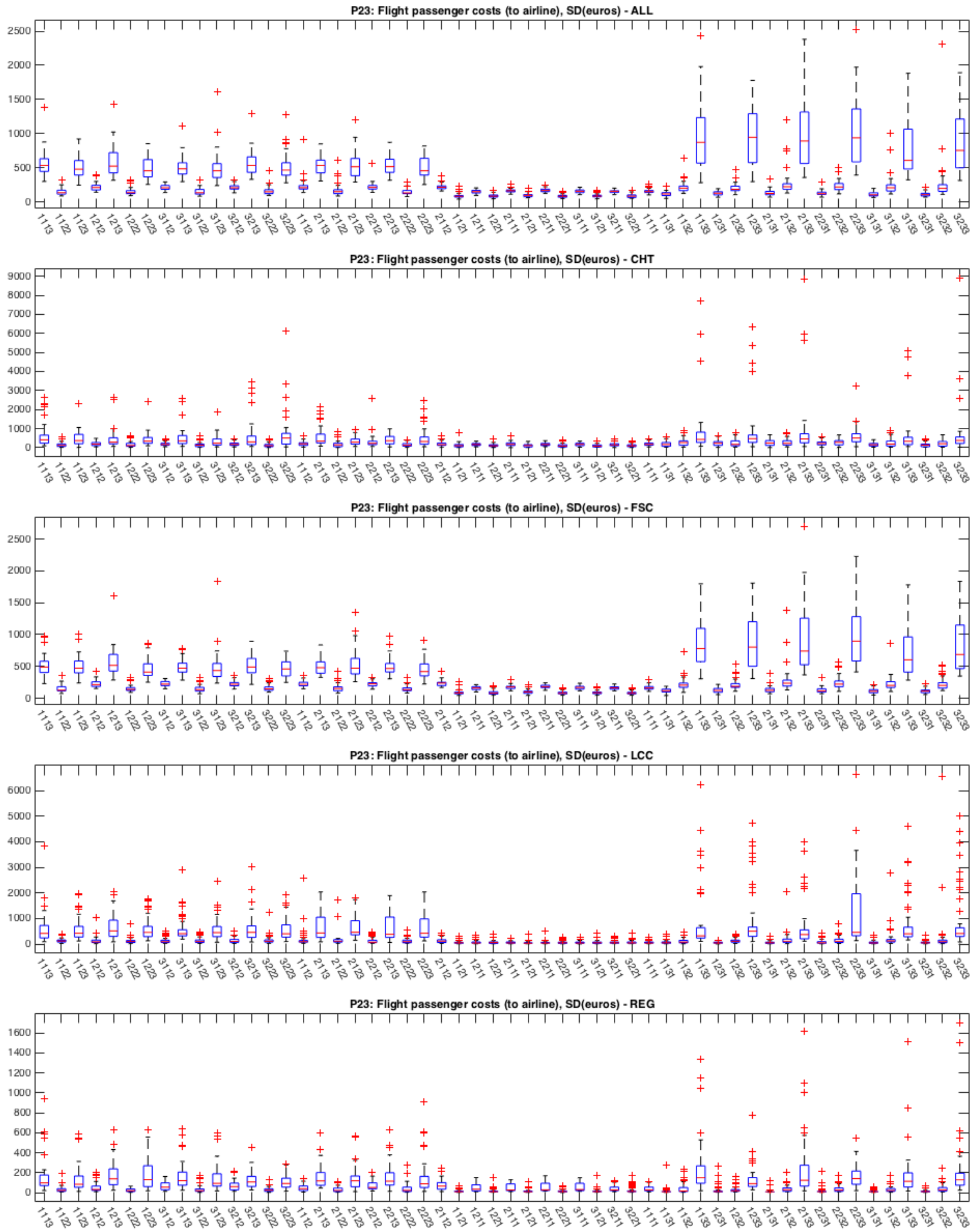

P23: Flight passenger costs (to airline), AVG(euros) - ALL

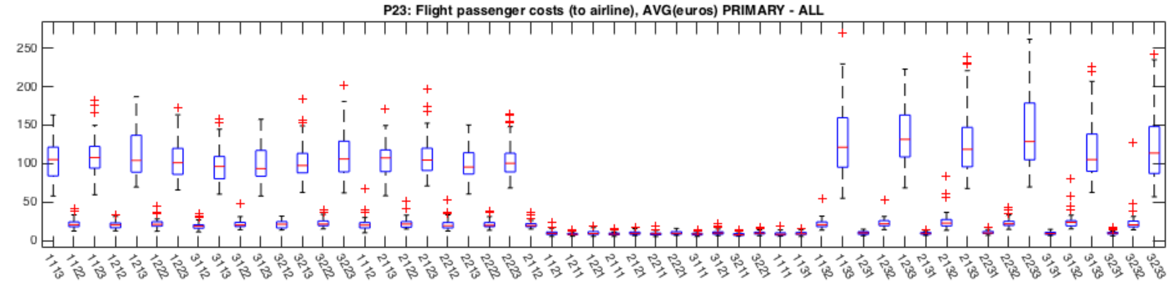

P23: Flight passenger costs (to airline), AVG(euros) - CHT

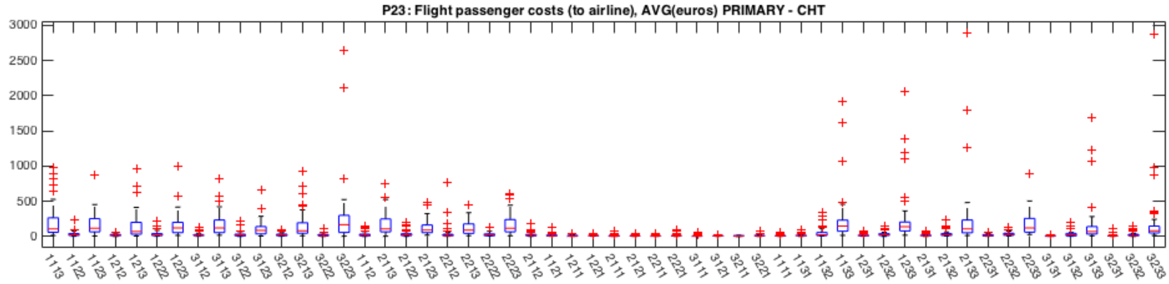

P23: Flight passenger costs (to airline), AVG(euros) - FSC

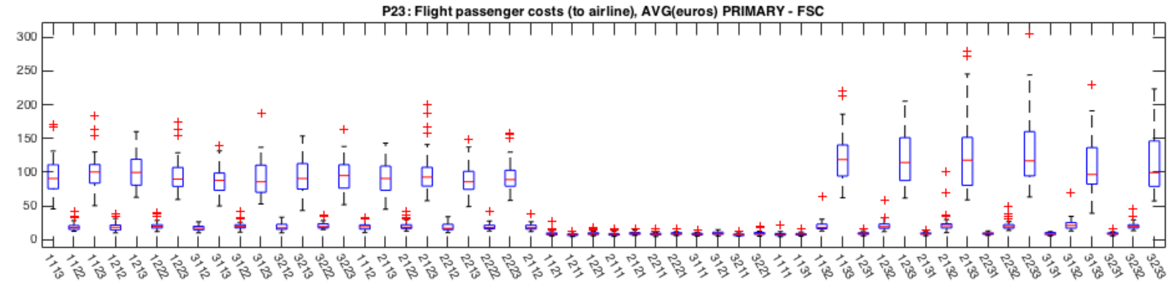

P23: Flight passenger costs (to airline), AVG(euros) - LCC

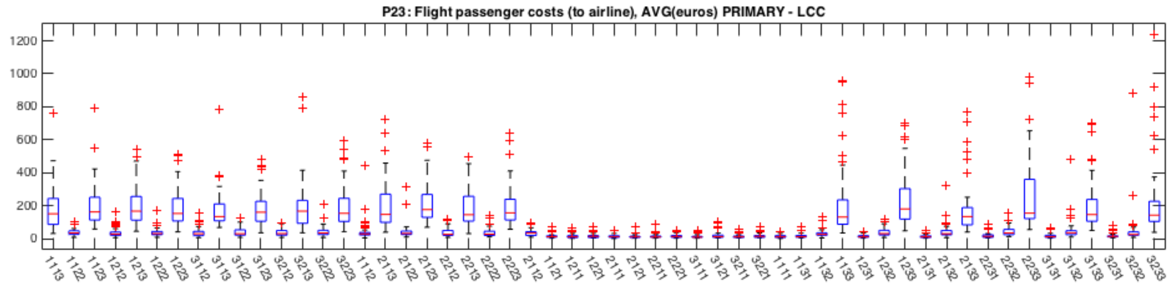

P23: Flight passenger costs (to airline), AVG(euros) - REG

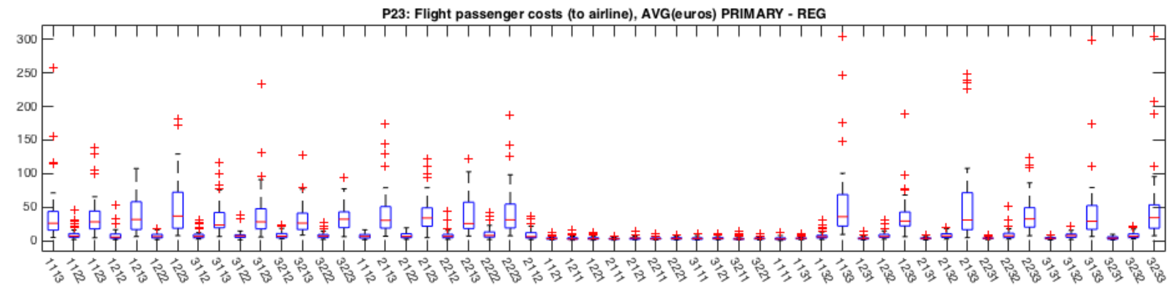

P23: Flight passenger costs (to airline), SD(euros) - ALL
P23: Flight passenger costs (to airline), SD(euros) - CHT
P23: Flight passenger costs (to airline), SD(euros) - FSC
P23: Flight passenger costs (to airline), SD(euros) - LCC
P23: Flight passenger costs (to airline), SD(euros) - REG

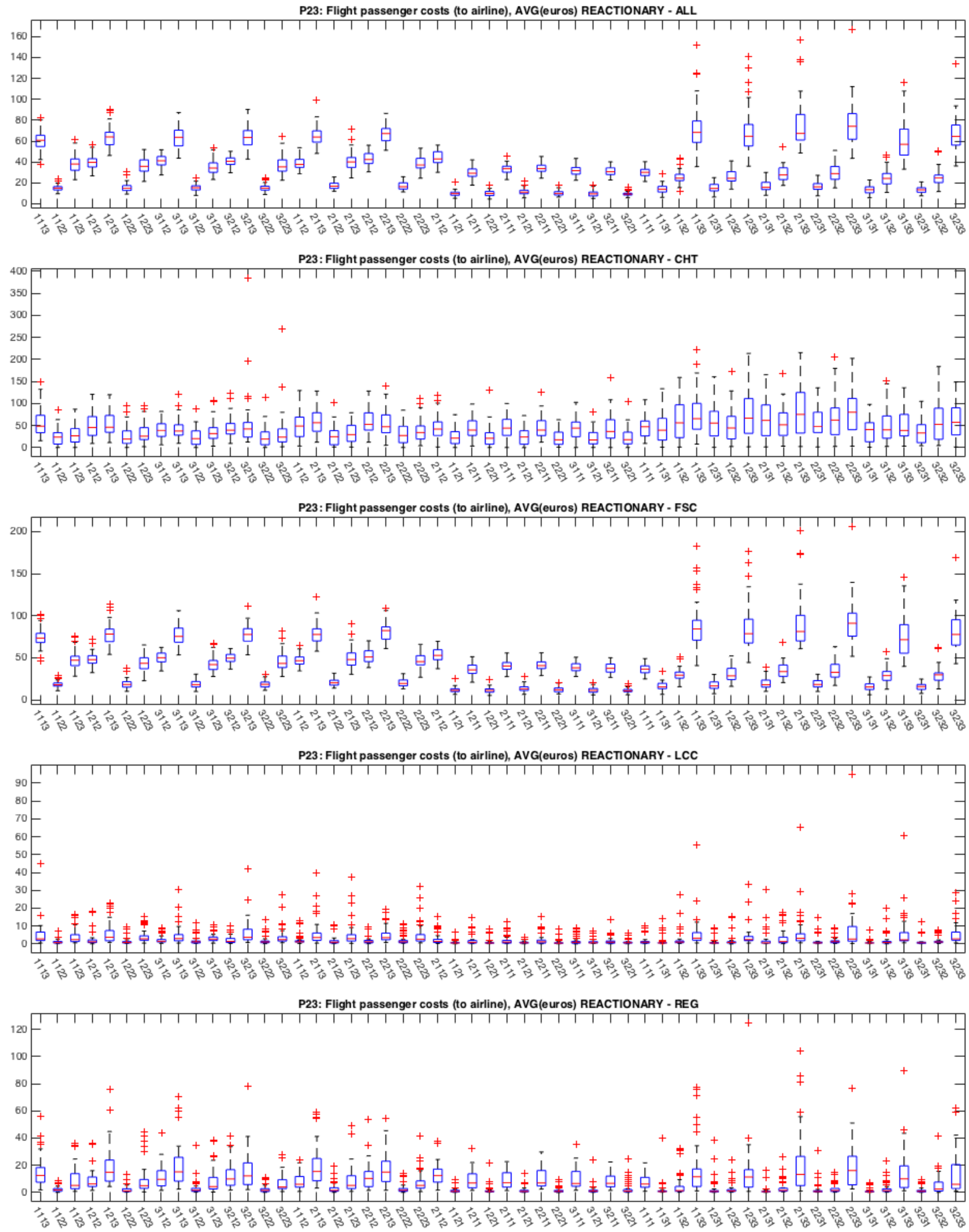

P23: Flight passenger costs (to airline), AVG(euros) PRIMARY - ALL

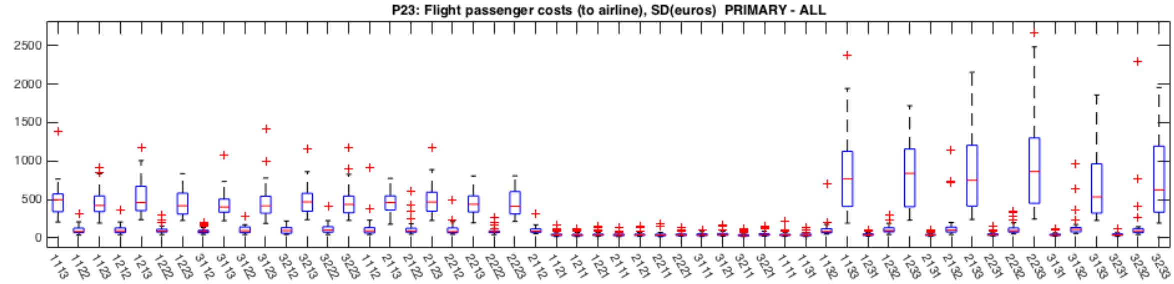

P23: Flight passenger costs (to airline), AVG(euros) PRIMARY - CHT

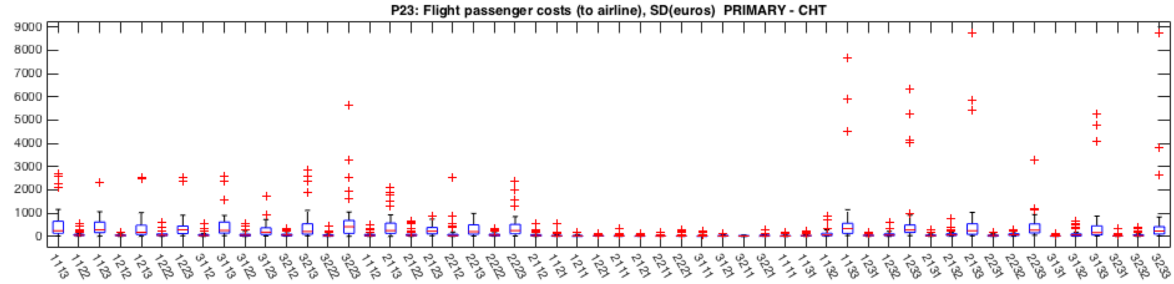

P23: Flight passenger costs (to airline), AVG(euros) PRIMARY - FSC

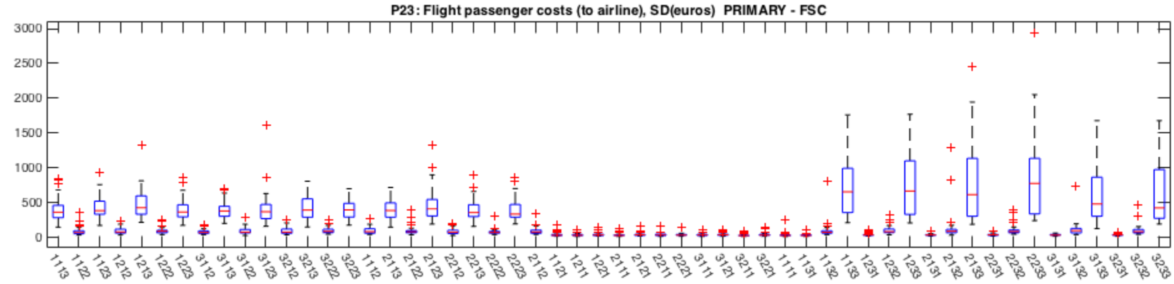

P23: Flight passenger costs (to airline), AVG(euros) PRIMARY - LCC

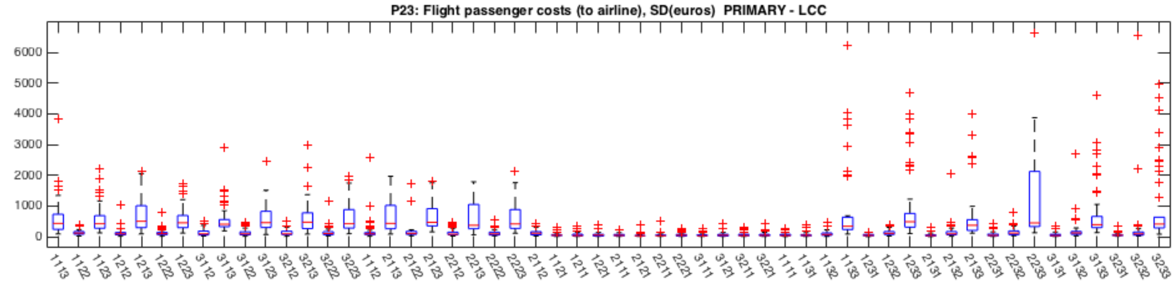

P23: Flight passenger costs (to airline), AVG(euros) PRIMARY - REG

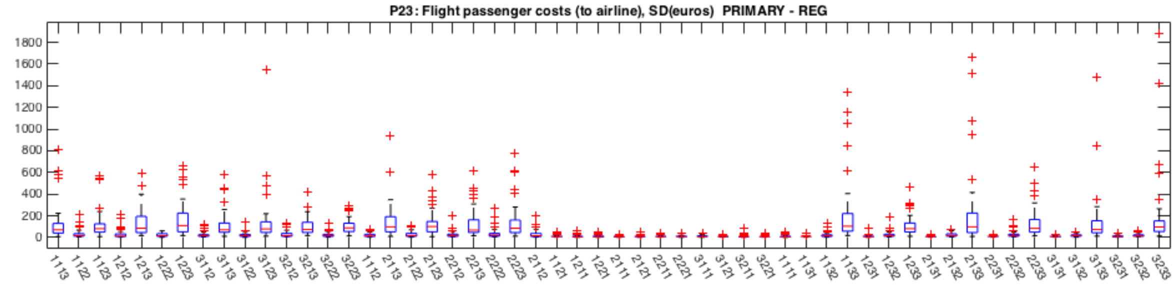

P23: Flight passenger costs (to airline), AVG(euros) REACTIONARY - ALL
P23: Flight passenger costs (to airline), AVG(euros) REACTIONARY - CHT
P23: Flight passenger costs (to airline), AVG(euros) REACTIONARY - FSC
P23: Flight passenger costs (to airline), AVG(euros) REACTIONARY - LCC
P23: Flight passenger costs (to airline), AVG(euros) REACTIONARY - REG

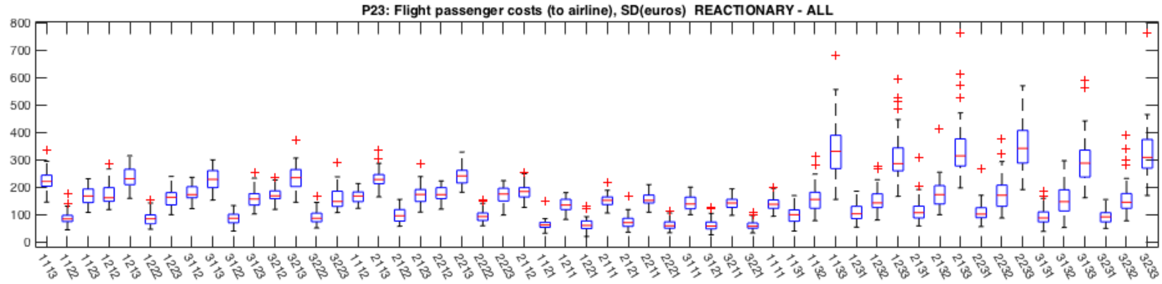

P23: Flight passenger costs (to airline), SD(euros) PRIMARY - ALL

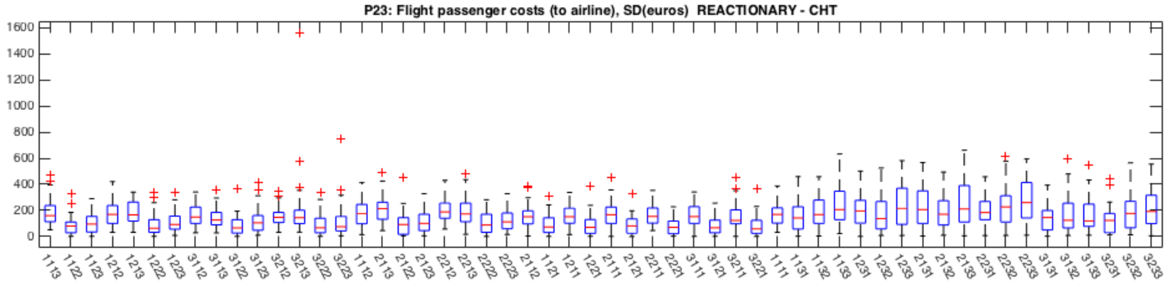

P23: Flight passenger costs (to airline), SD(euros) PRIMARY - CHT

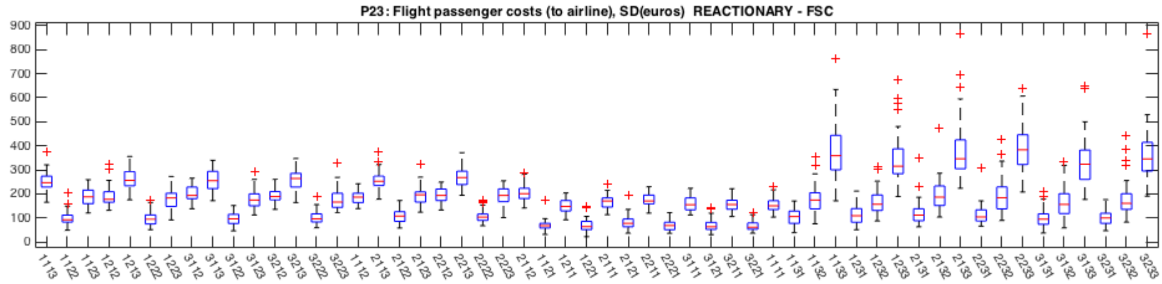

P23: Flight passenger costs (to airline), SD(euros) PRIMARY - FSC

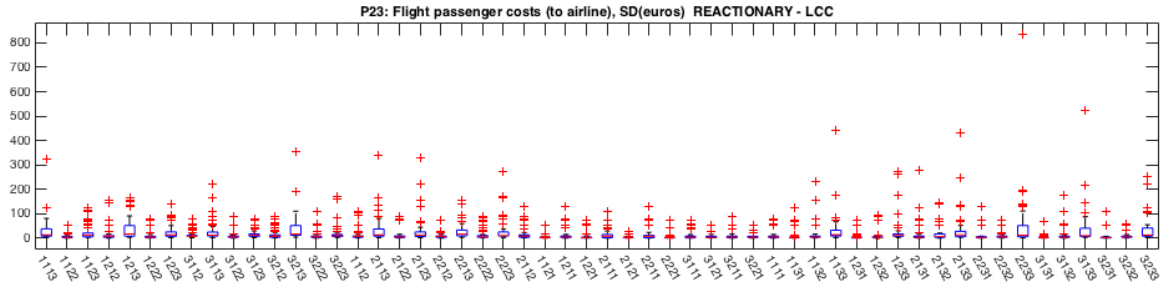

P23: Flight passenger costs (to airline), SD(euros) PRIMARY - LCC

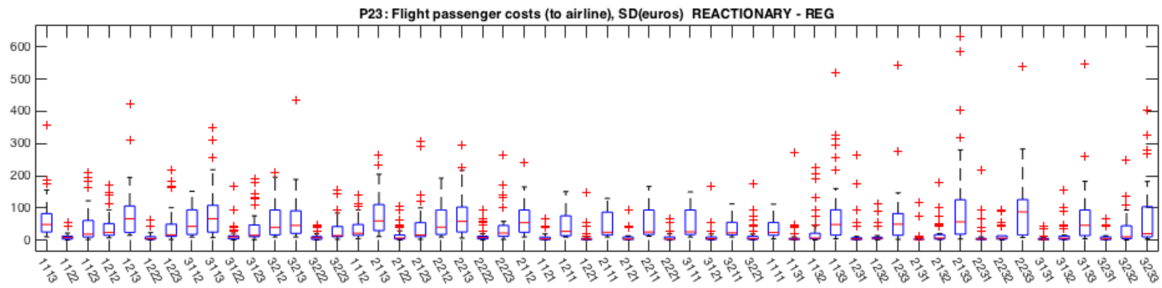

P23: Flight passenger costs (to airline), SD(euros) PRIMARY - REG

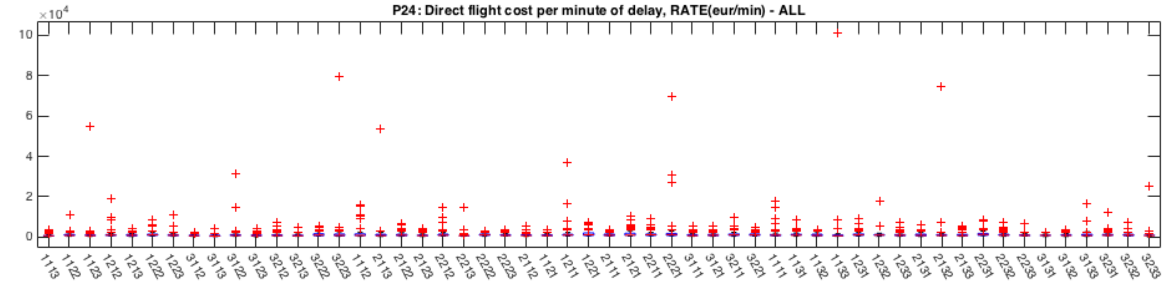

P23: Flight passenger costs (to airline), SD(euros) REACTIONARY - ALL

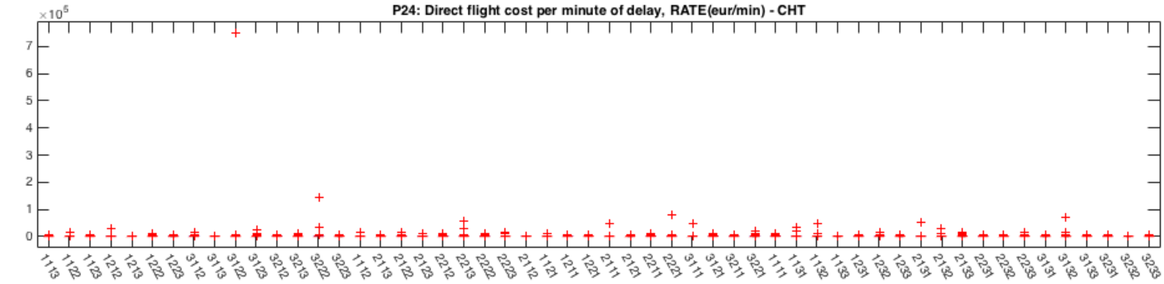

P23: Flight passenger costs (to airline), SD(euros) REACTIONARY - CHT

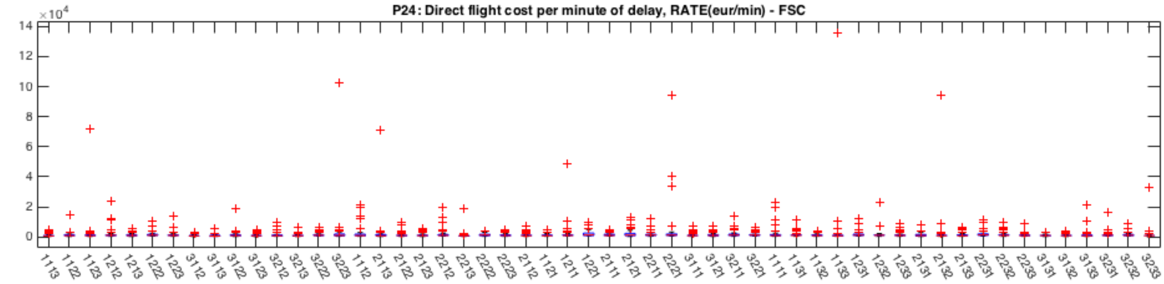

P23: Flight passenger costs (to airline), SD(euros) REACTIONARY - FSC

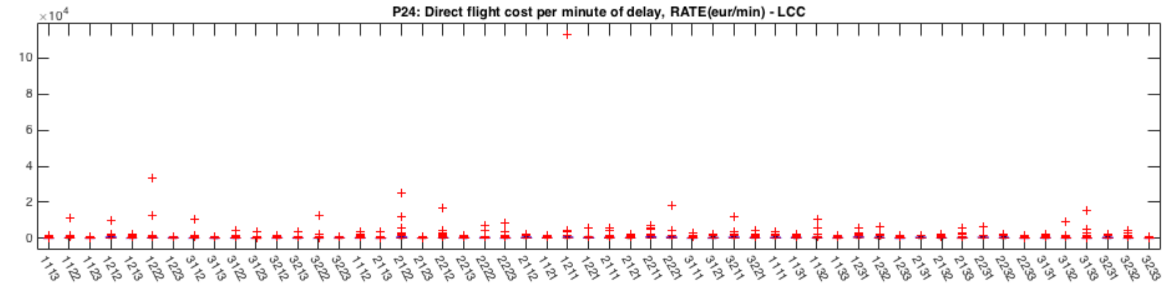

P23: Flight passenger costs (to airline), SD(euros) REACTIONARY - LCC

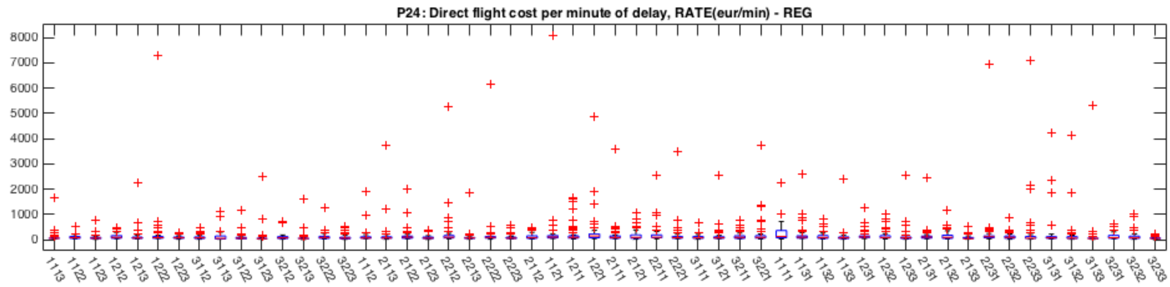

P23: Flight passenger costs (to airline), SD(euros) REACTIONARY - REG

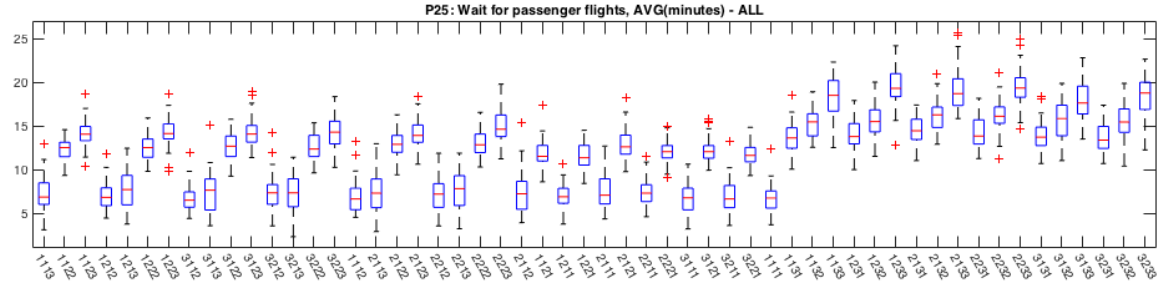

P24: Direct flight cost per minute of delay, RATE(eur/min) - ALL

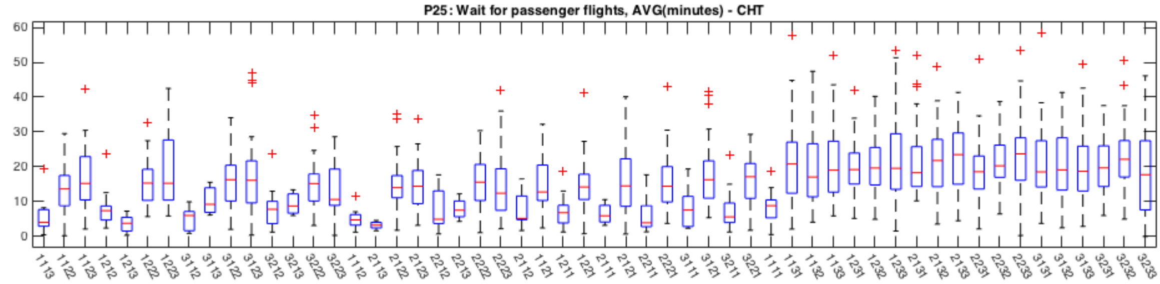

P24: Direct flight cost per minute of delay, RATE(eur/min) - CHT

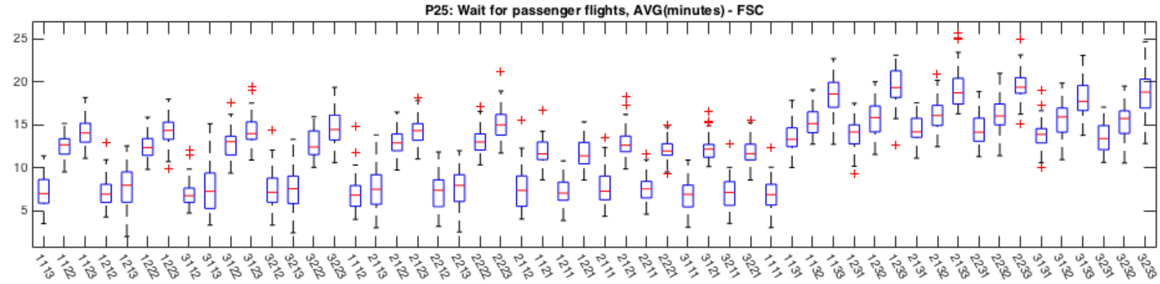

P24: Direct flight cost per minute of delay, RATE(eur/min) - FSC

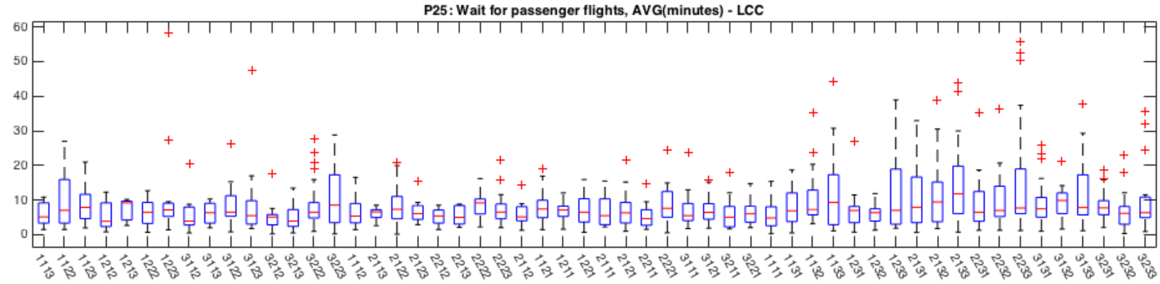

P24: Direct flight cost per minute of delay, RATE(eur/min) - LCC

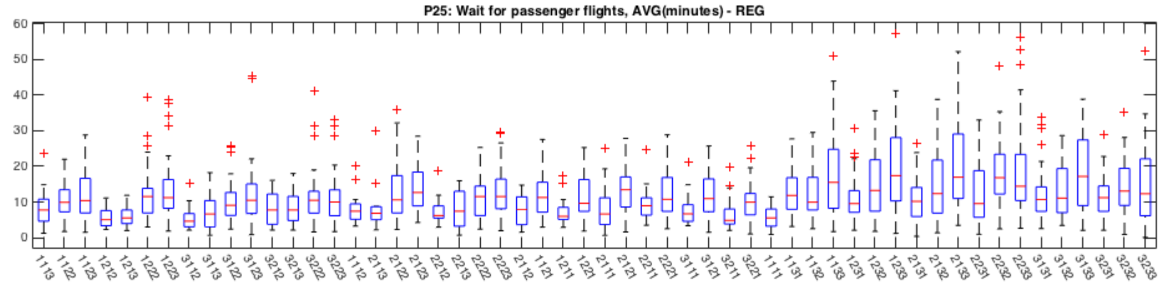

P24: Direct flight cost per minute of delay, RATE(eur/min) - REG

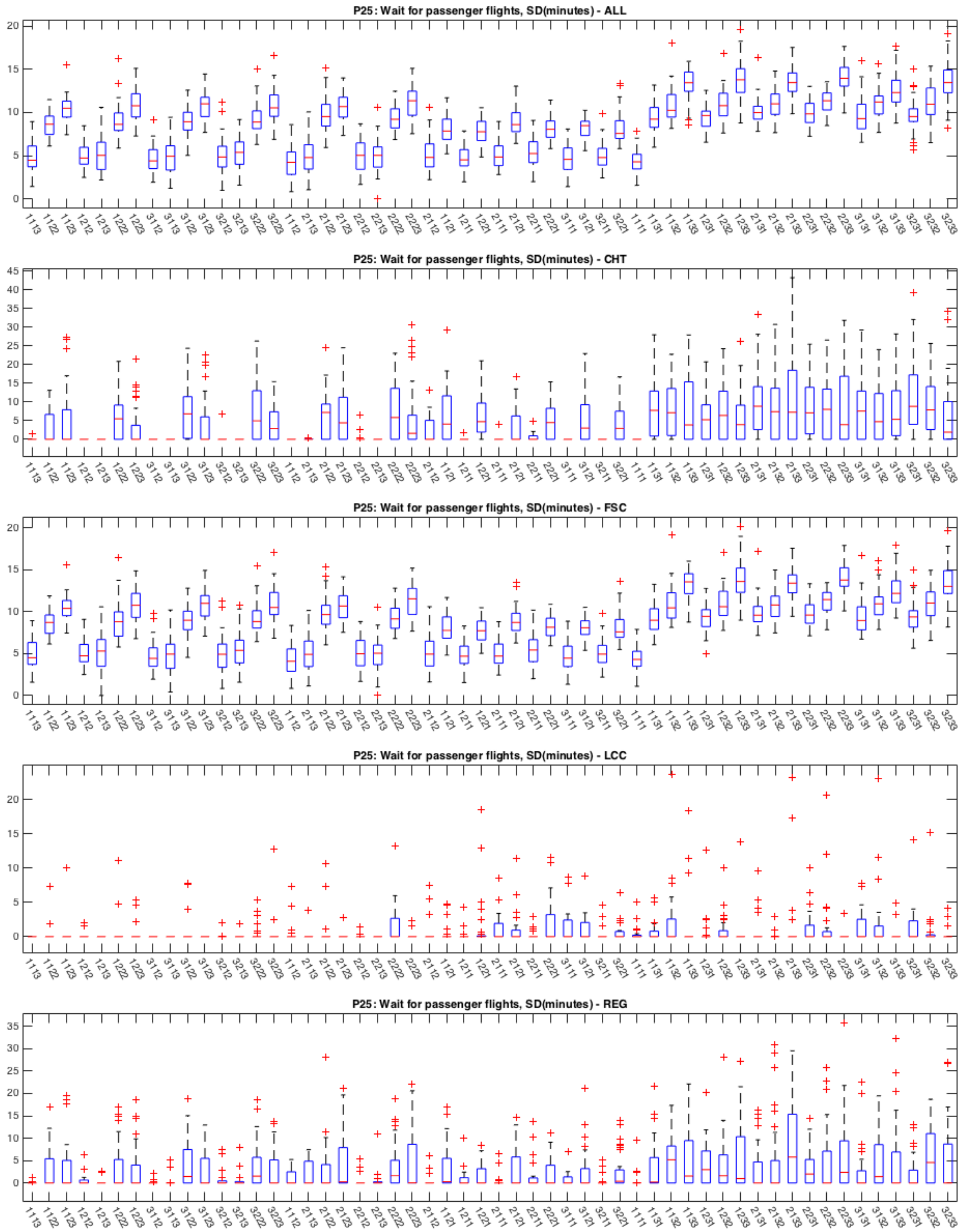

P25: Wait for passenger flights, AVG(minutes) - ALL

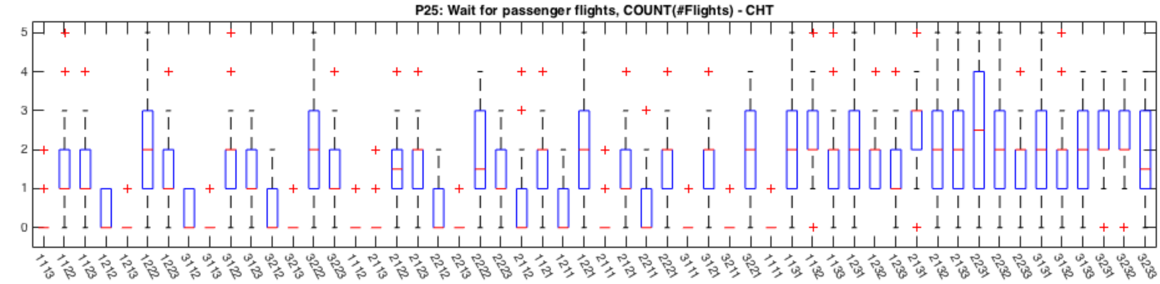

P25: Wait for passenger flights, AVG(minutes) - CHT

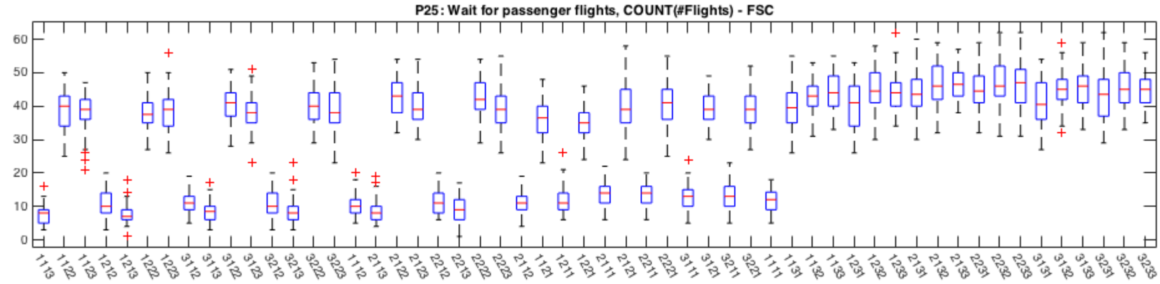

P25: Wait for passenger flights, AVG(minutes) - FSC

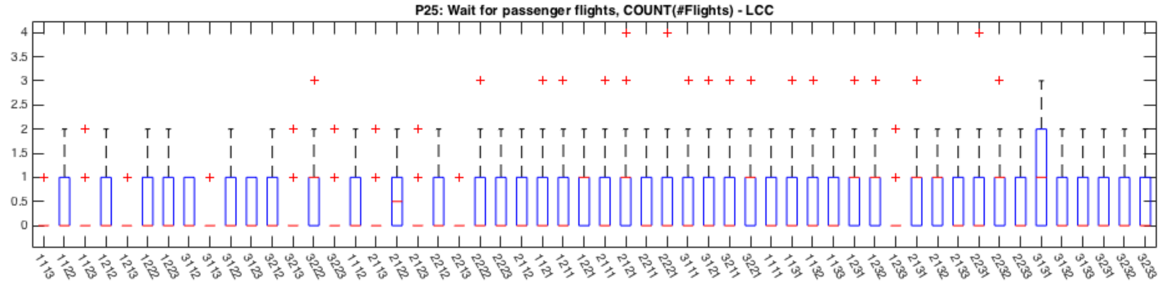

P25: Wait for passenger flights, AVG(minutes) - LCC

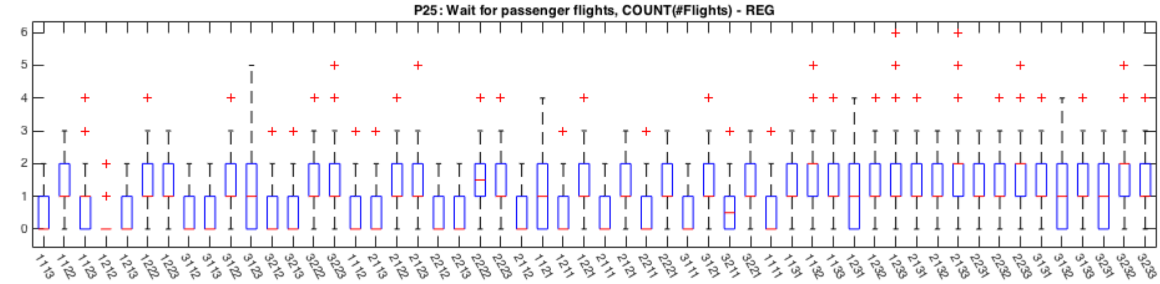

P25: Wait for passenger flights, AVG(minutes) - REG

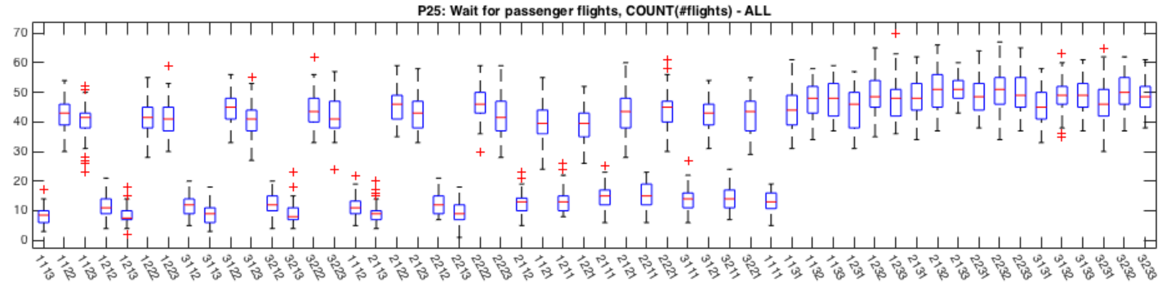

P25: Wait for passenger flights, SD(minutes) - ALL
P25: Wait for passenger flights, SD(minutes) - CHT
P25: Wait for passenger flights, SD(minutes) - FSC
P25: Wait for passenger flights, SD(minutes) - LCC
P25: Wait for passenger flights, SD(minutes) - REG

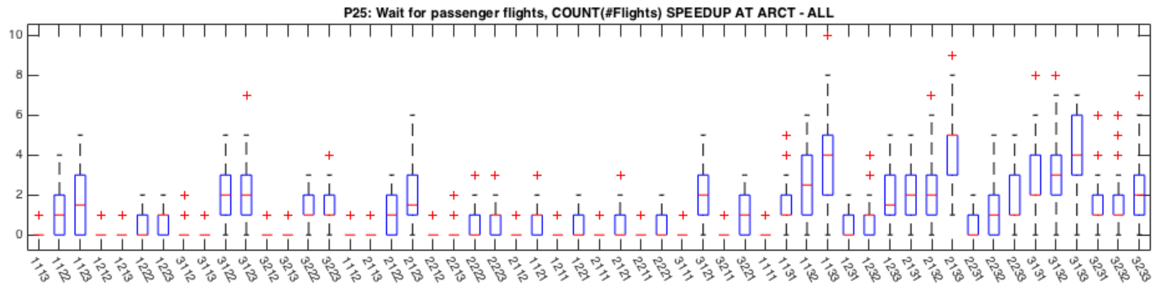

P25: Wait for passenger flights, COUNT(#Flights) - CHT

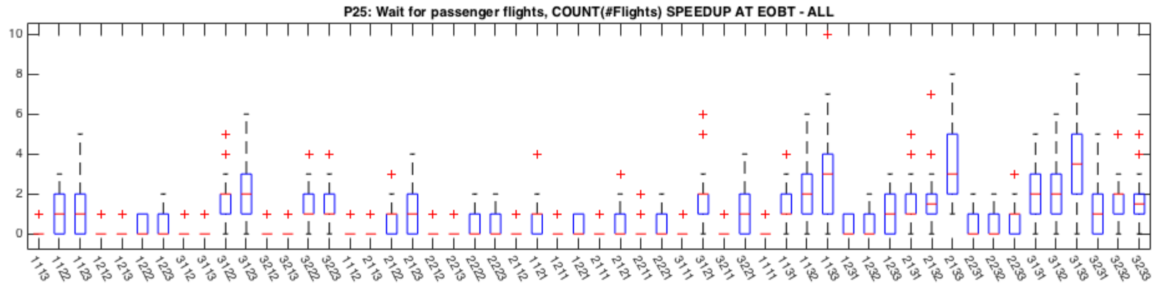

P25: Wait for passenger flights, COUNT(#Flights) - FSC

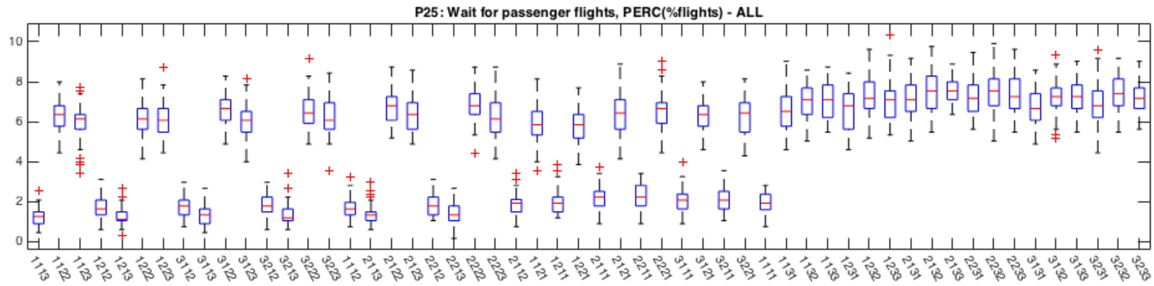

P25: Wait for passenger flights, COUNT(#Flights) - LCC

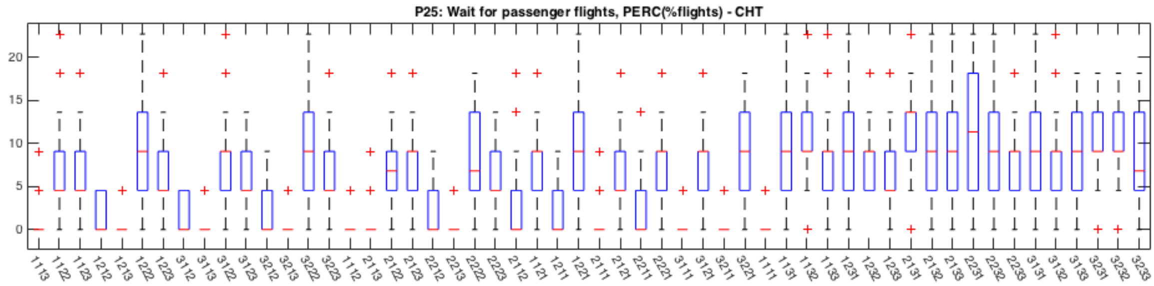

P25: Wait for passenger flights, COUNT(#Flights) - REG

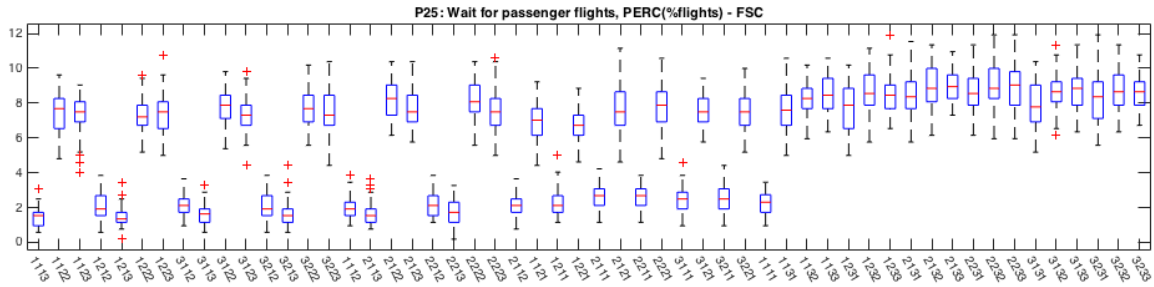

P25: Wait for passenger flights, COUNT(#flights) - ALL

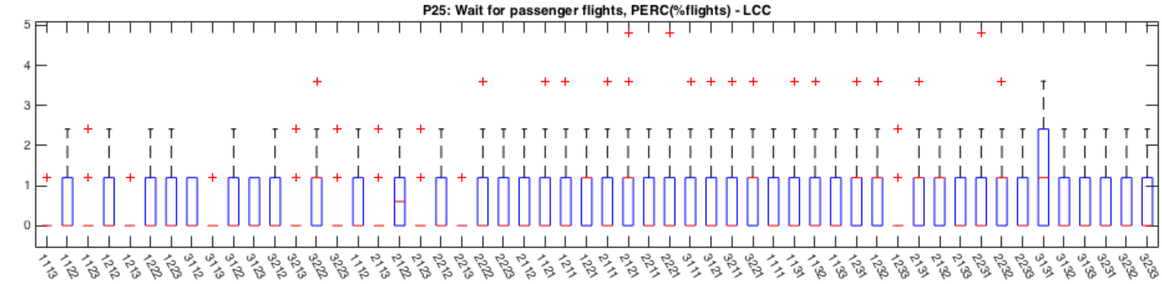

P25: Wait for passenger flights, COUNT(#Flights) SPEEDUP AT ARCT - ALL

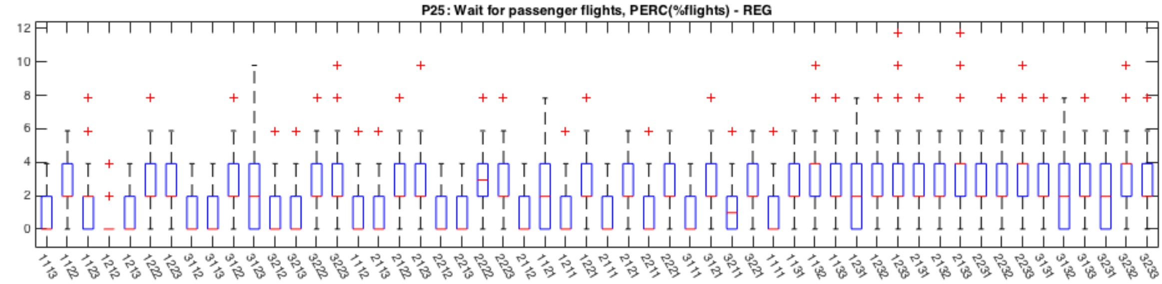

P25: Wait for passenger flights, COUNT(#Flights) SPEEDUP AT EOBT - ALL

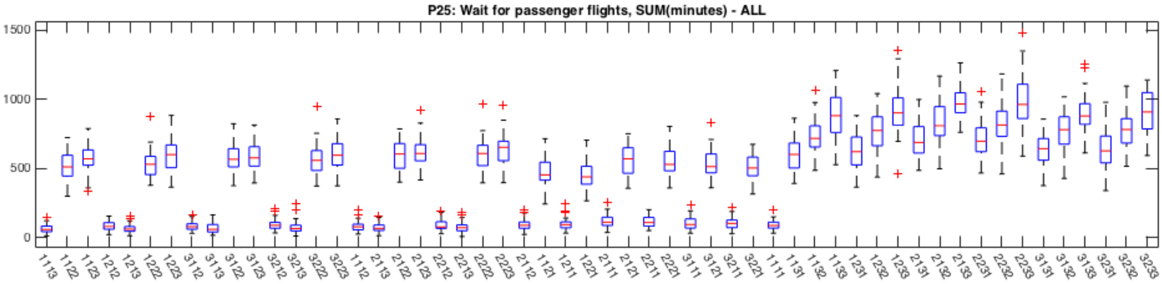

P25: Wait for passenger flights, PERC(%flights) - ALL

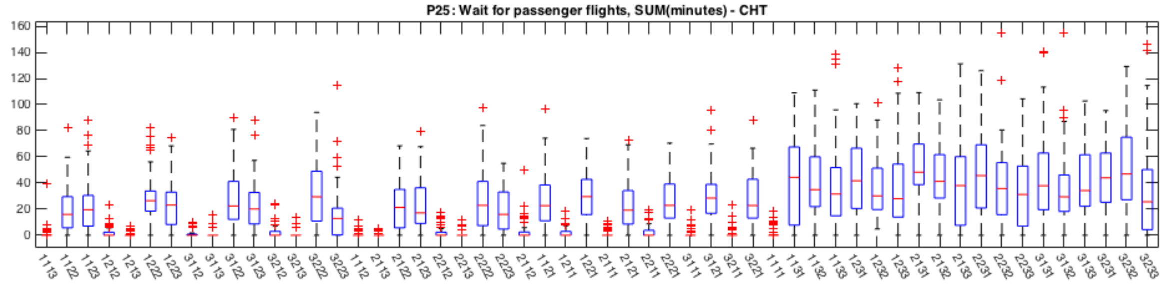

P25: Wait for passenger flights, PERC(%flights) - CHT

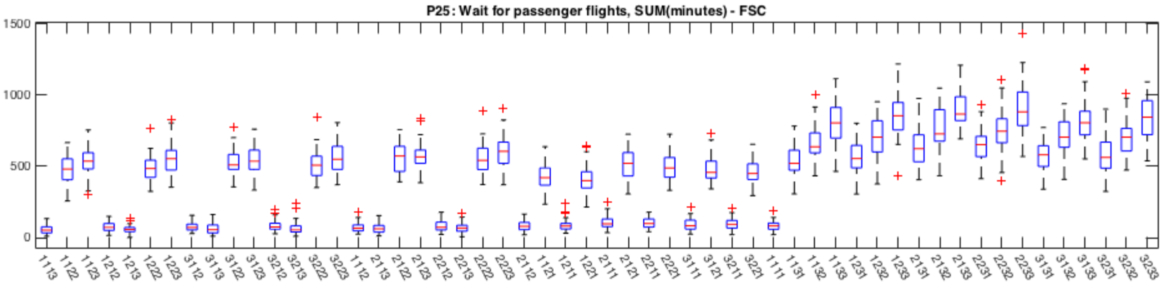

P25: Wait for passenger flights, PERC(%flights) - FSC

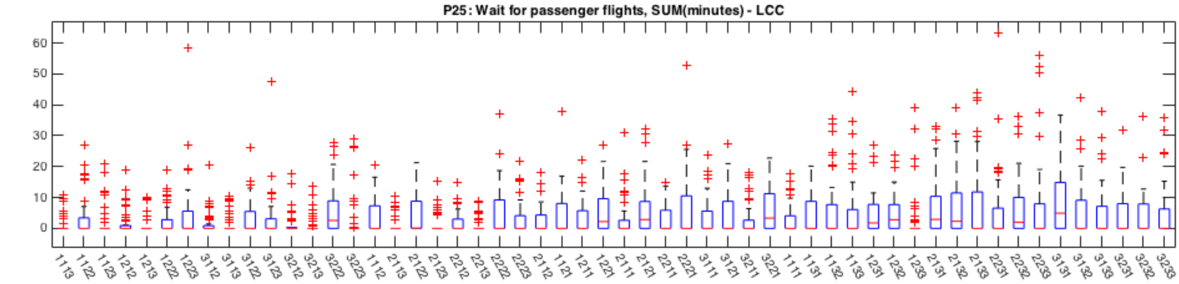

P25: Wait for passenger flights, PERC(%flights) - LCC

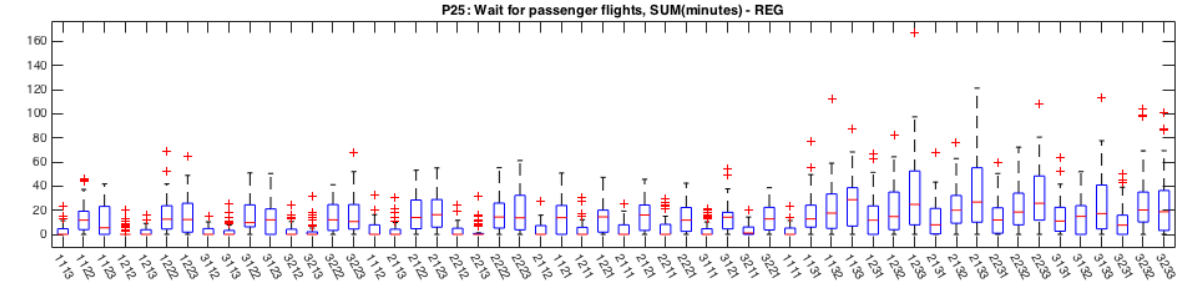

P25: Wait for passenger flights, PERC(%flights) - REG

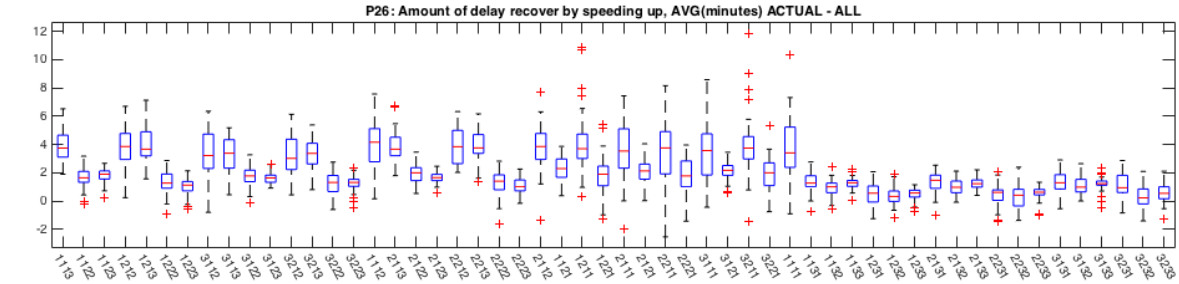

P25: Wait for passenger flights, SUM(minutes) - ALL

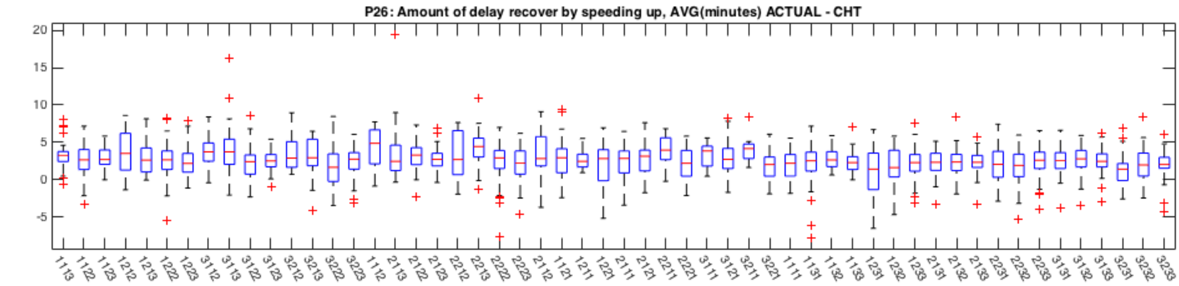

P25: Wait for passenger flights, SUM(minutes) - CHT

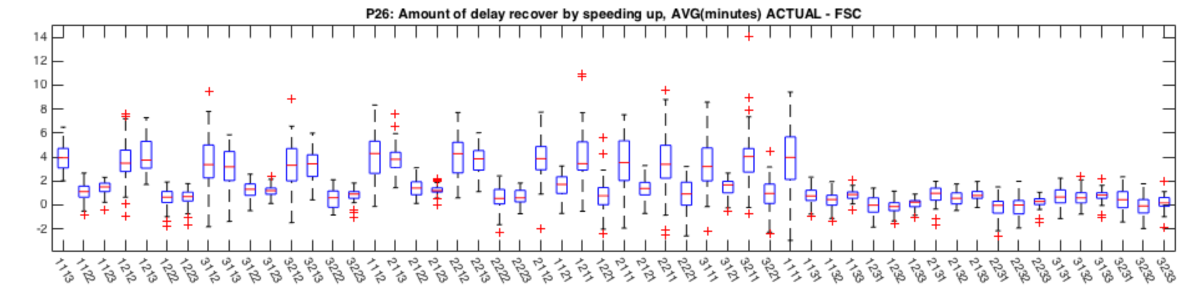

P25: Wait for passenger flights, SUM(minutes) - FSC


P25: Wait for passenger flights, SUM(minutes) - LCC

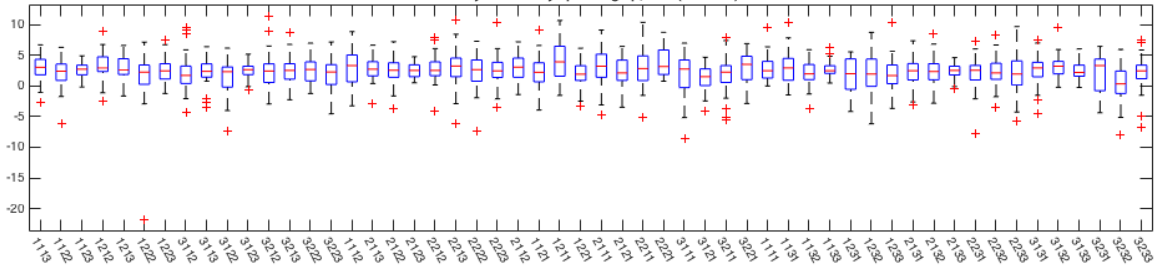

P25: Wait for passenger flights, SUM(minutes) - REG


P26: Amount of delay recover by speeding up, AVG(minutes) ACTUAL - ALL

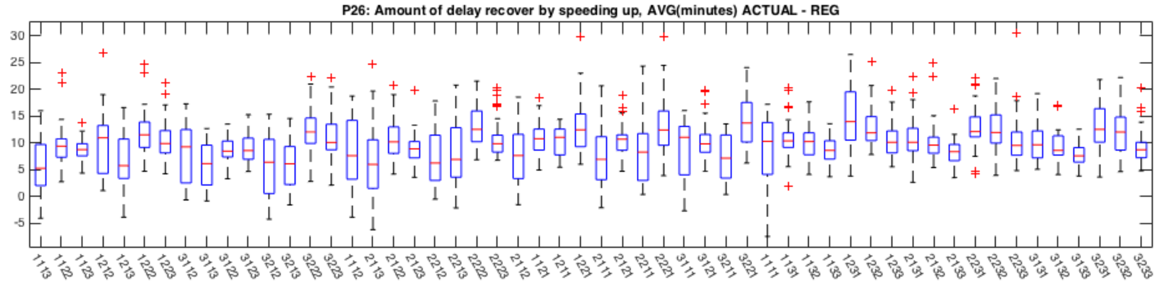

P26: Amount of delay recover by speeding up, AVG(minutes) ACTUAL - CHT


P26: Amount of delay recover by speeding up, AVG(minutes) ACTUAL - FSC

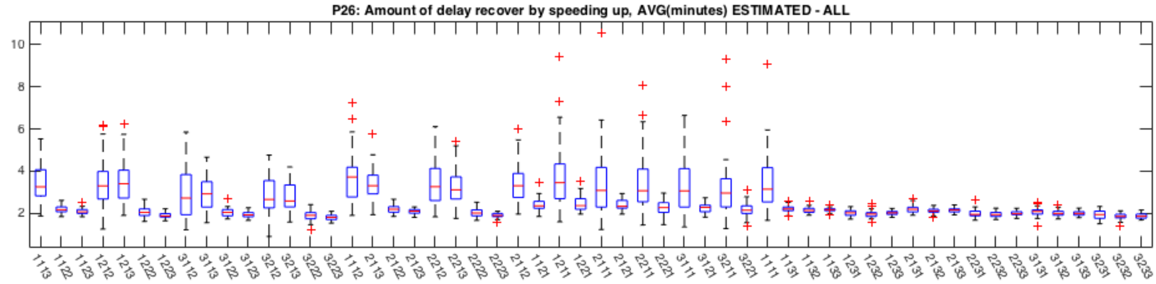
P26: Amount of delay recover by speeding up, AVG(minutes) ACTUAL - LCC



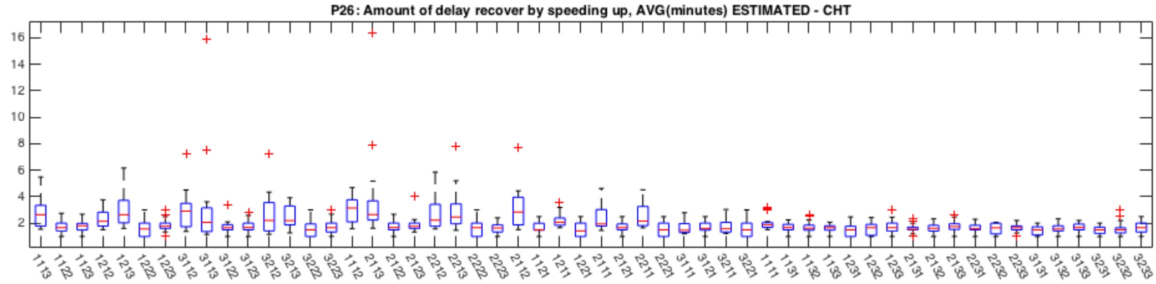
P26: Amount of delay recover by speeding up, AVG(minutes) ACTUAL - REG



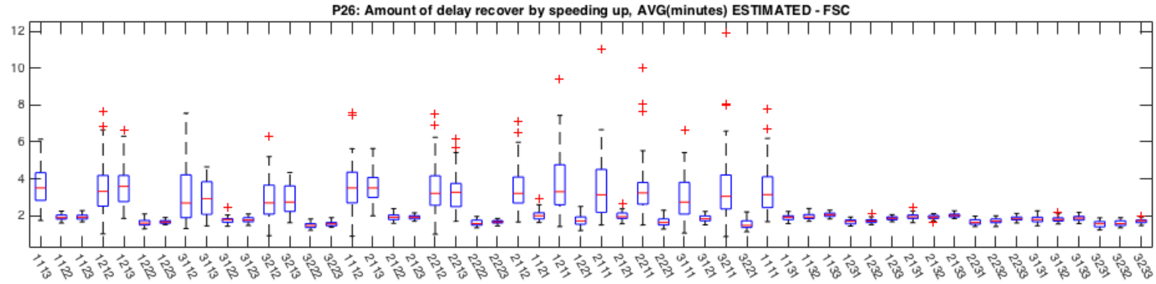
P26: Amount of delay recover by speeding up, AVG(minutes) ESTIMATED - ALL



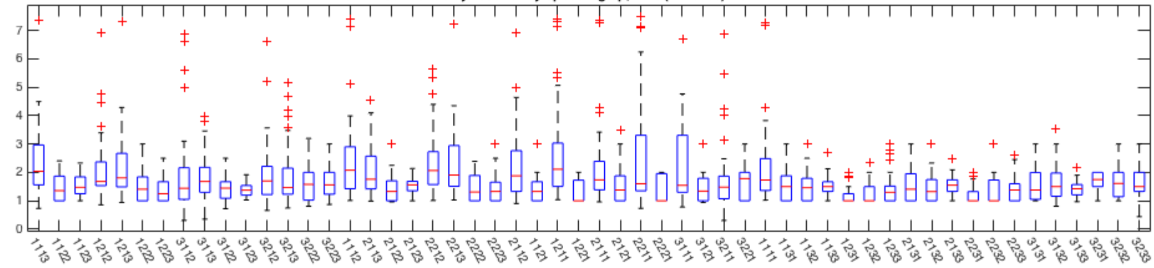
P26: Amount of delay recover by speeding up, AVG(minutes) ESTIMATED - CHT



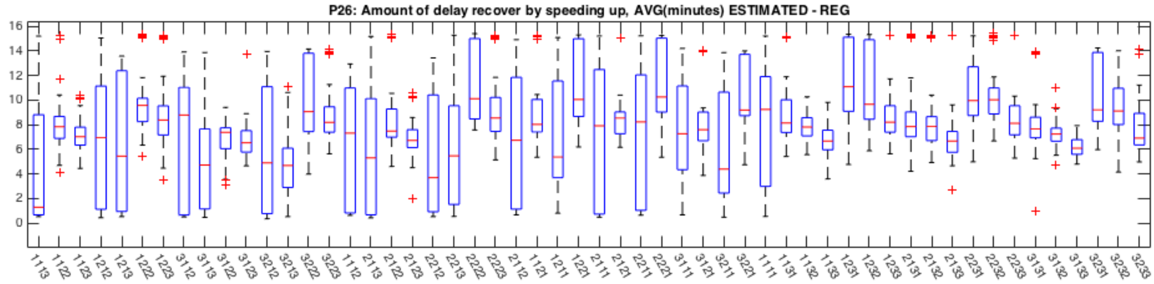
P26: Amount of delay recover by speeding up, AVG(minutes) ESTIMATED - FSC



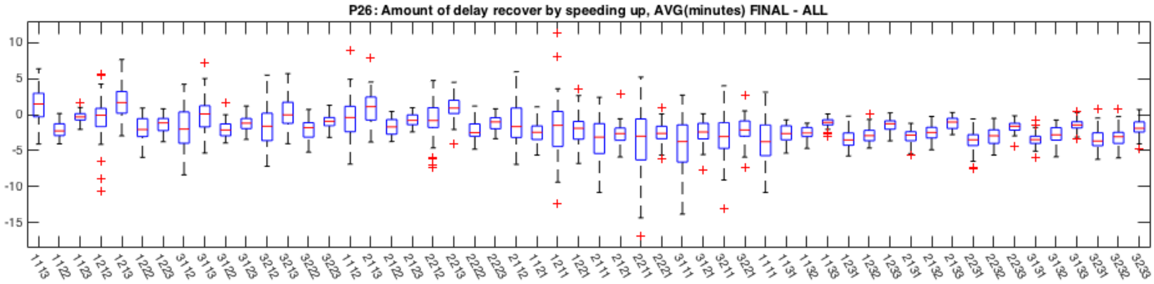
P26: Amount of delay recover by speeding up, AVG(minutes) ESTIMATED - LCC



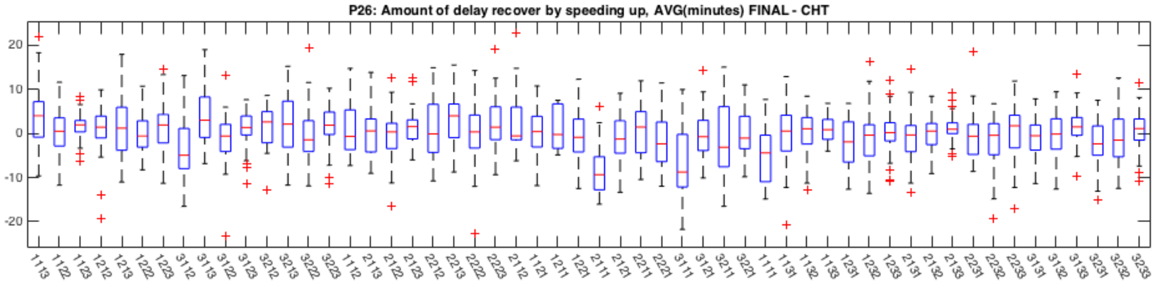
P26: Amount of delay recover by speeding up, AVG(minutes) ESTIMATED - REG



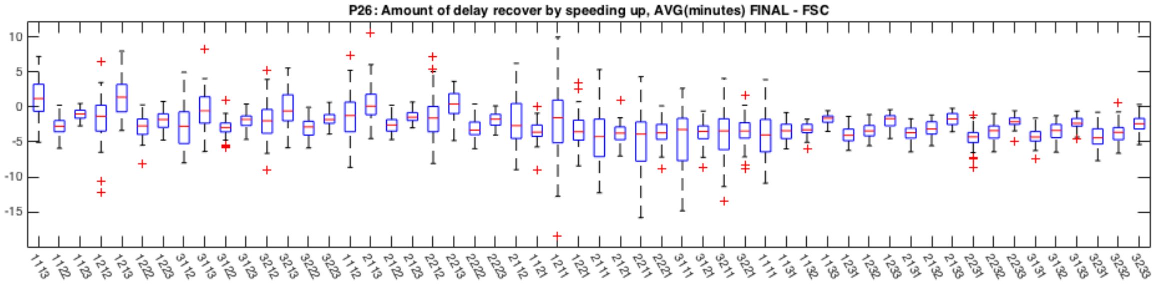
P26: Amount of delay recover by speeding up, AVG(minutes) FINAL - ALL

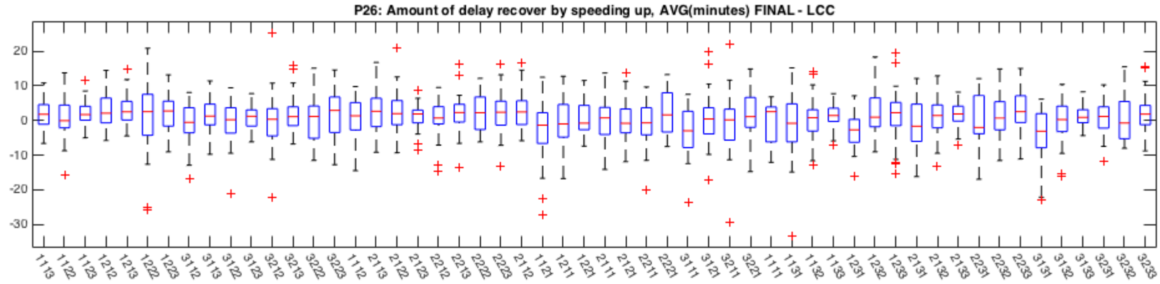


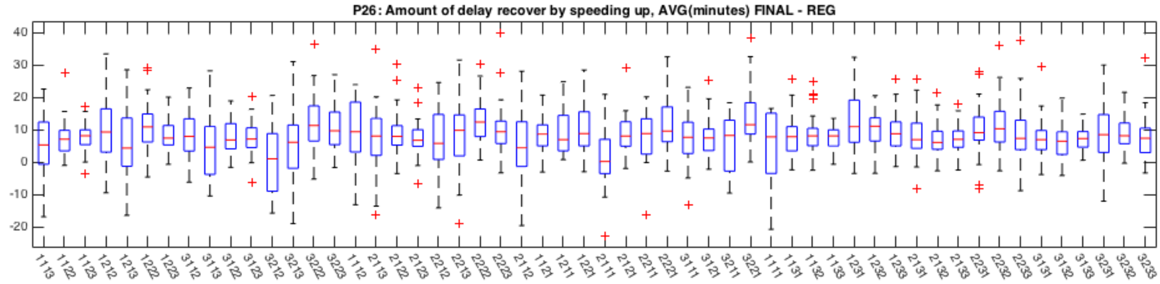
P26: Amount of delay recover by speeding up, AVG(minutes) FINAL - CHT

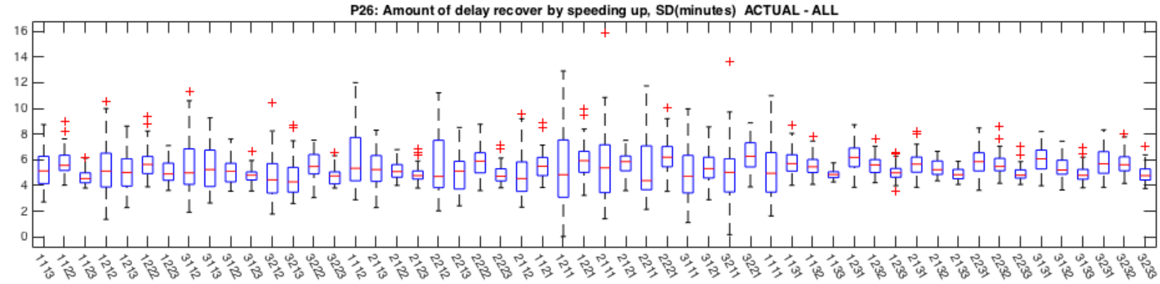


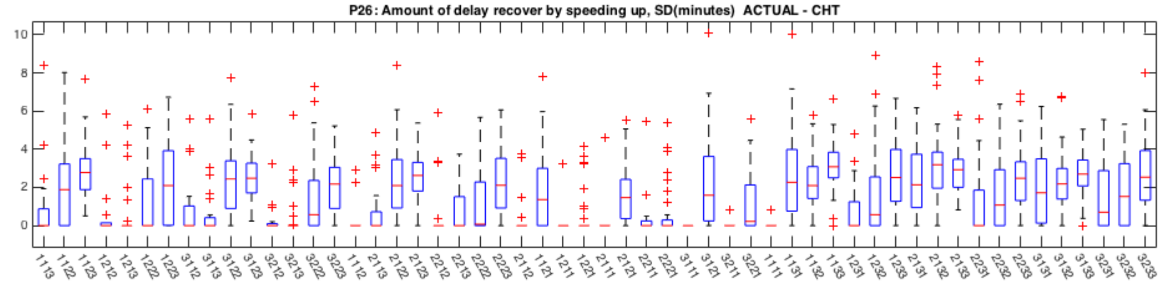
P26: Amount of delay recover by speeding up, AVG(minutes) FINAL - FSC

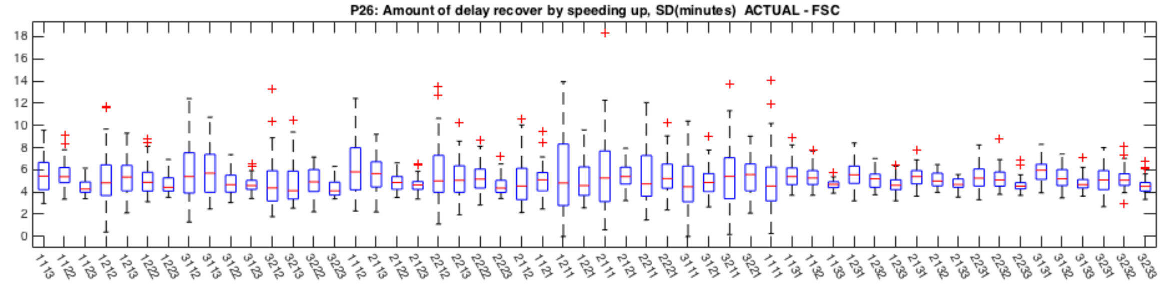


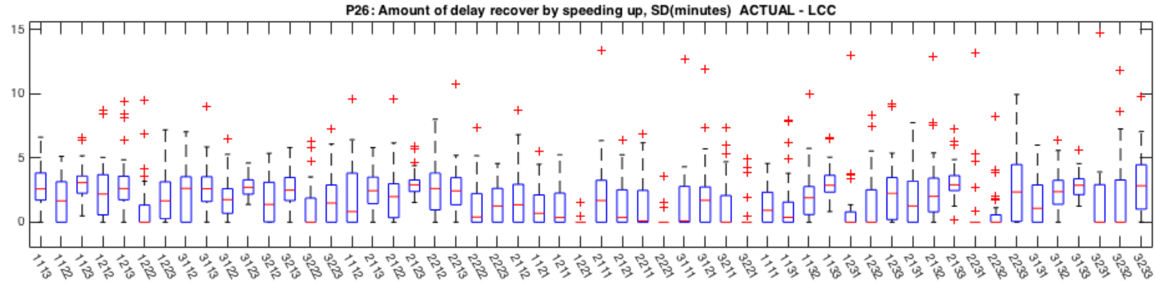

P26: Amount of delay recover by speeding up, AVG(minutes) FINAL - LCC

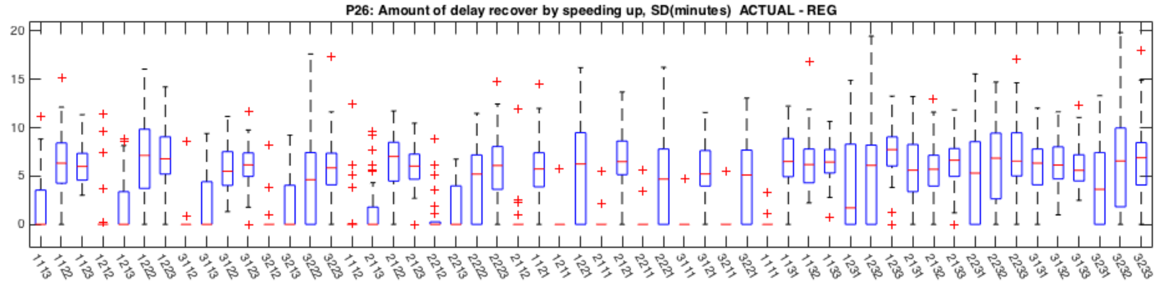

P26: Amount of delay recover by speeding up, AVG(minutes) FINAL - REG

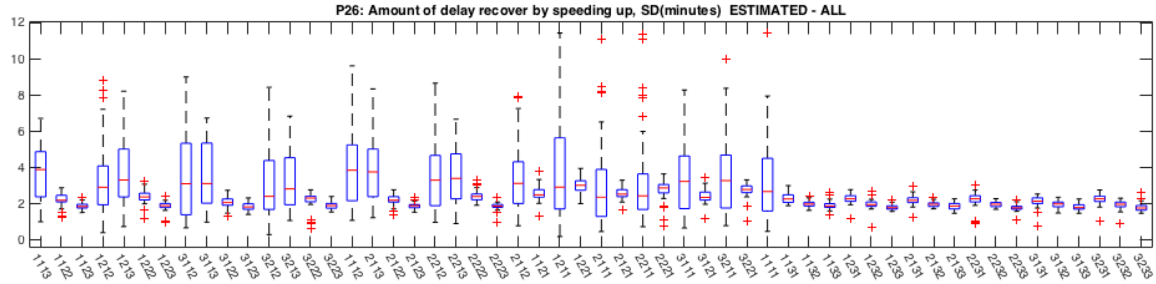

P26: Amount of delay recover by speeding up, SD(minutes) ACTUAL - ALL

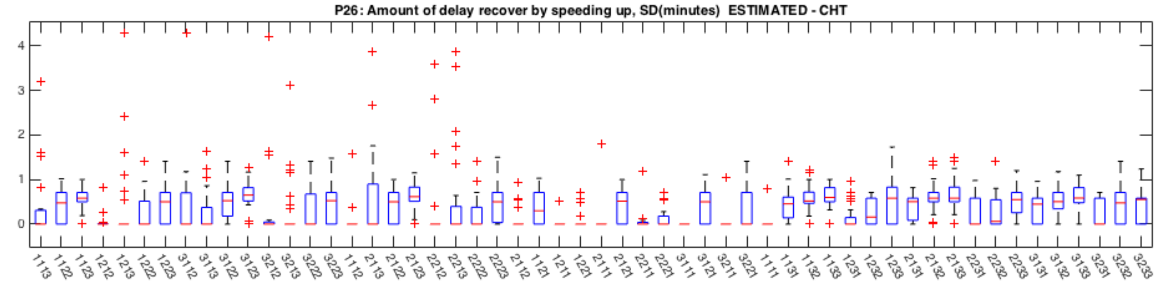

P26: Amount of delay recover by speeding up, SD(minutes) ACTUAL - CHT

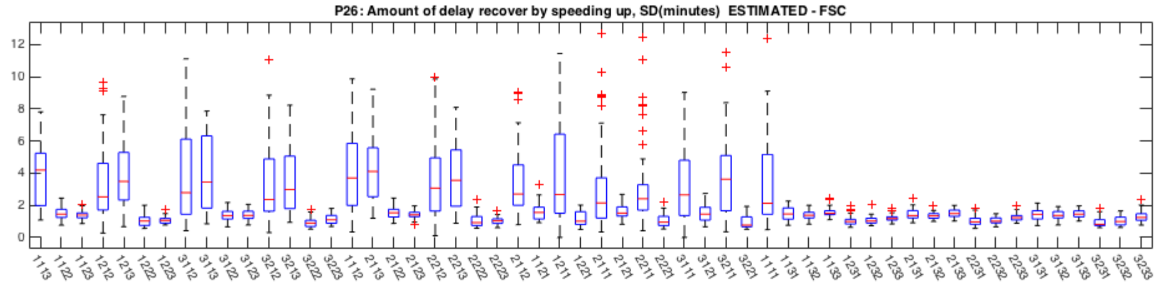

P26: Amount of delay recover by speeding up, SD(minutes) ACTUAL - FSC

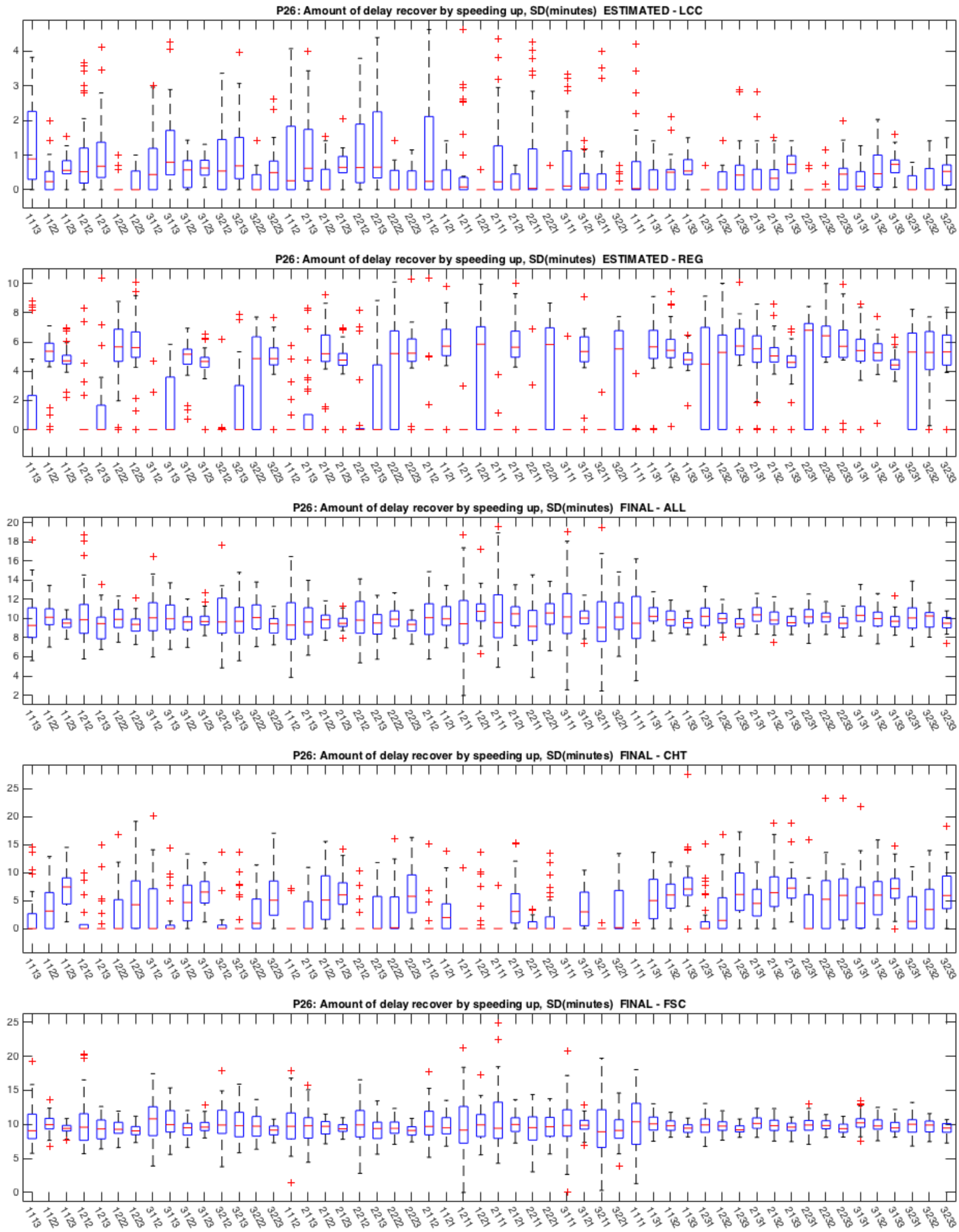

P26: Amount of delay recover by speeding up, SD(minutes) ACTUAL - LCC

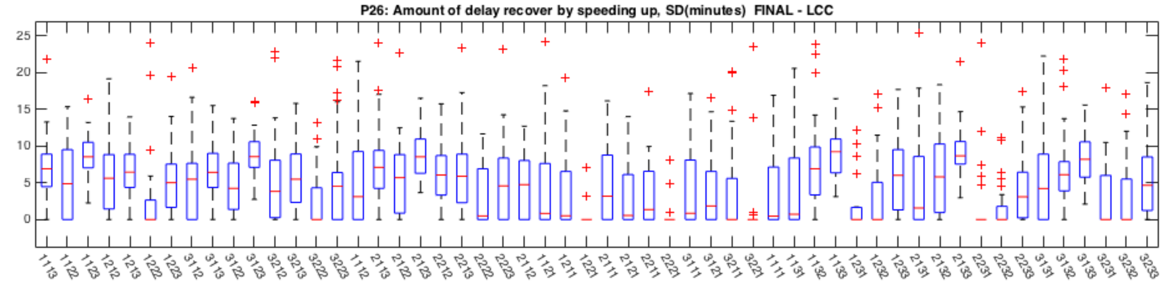

P26: Amount of delay recover by speeding up, SD(minutes) ACTUAL - REG

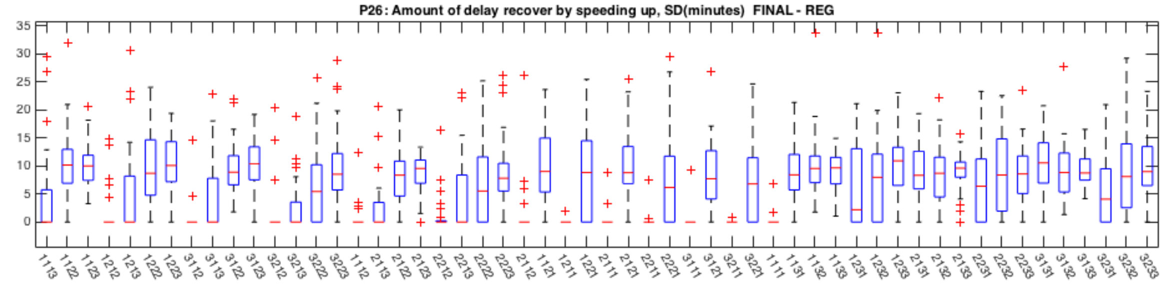

P26: Amount of delay recover by speeding up, SD(minutes) ESTIMATED - ALL

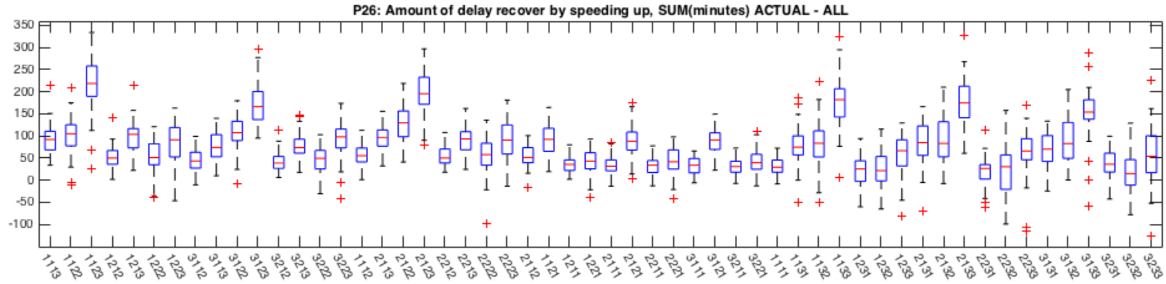

P26: Amount of delay recover by speeding up, SD(minutes) ESTIMATED - CHT

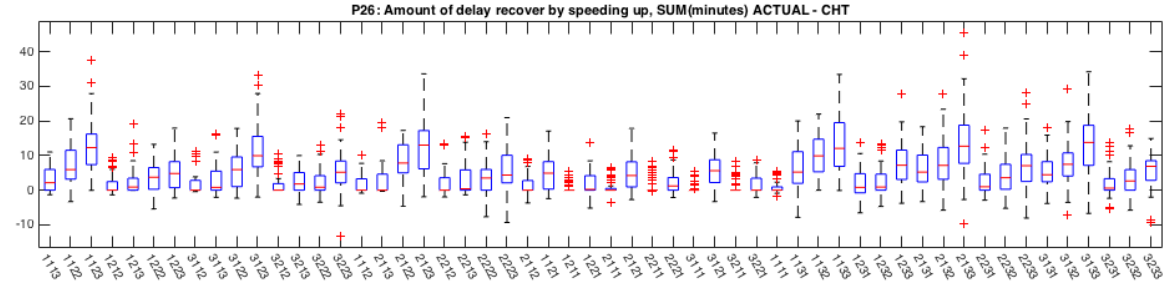

P26: Amount of delay recover by speeding up, SD(minutes) ESTIMATED - FSC

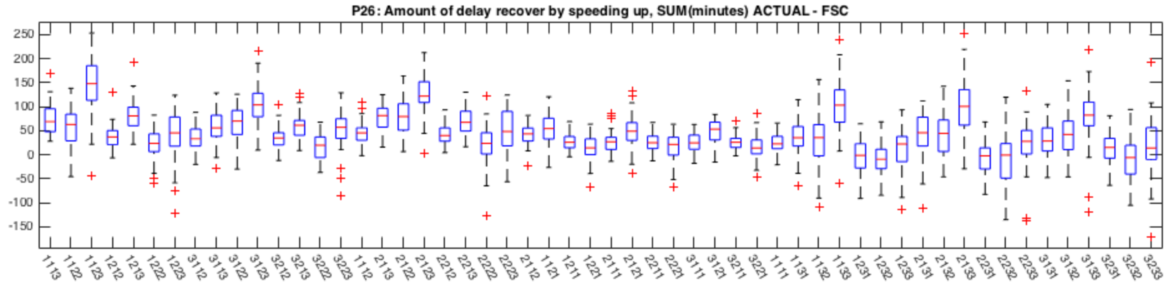

P26: Amount of delay recover by speeding up, SD(minutes) ESTIMATED - LCC
P26: Amount of delay recover by speeding up, SD(minutes) ESTIMATED - REG
P26: Amount of delay recover by speeding up, SD(minutes) FINAL - ALL
P26: Amount of delay recover by speeding up, SD(minutes) FINAL - CHT
P26: Amount of delay recover by speeding up, SD(minutes) FINAL - FSC

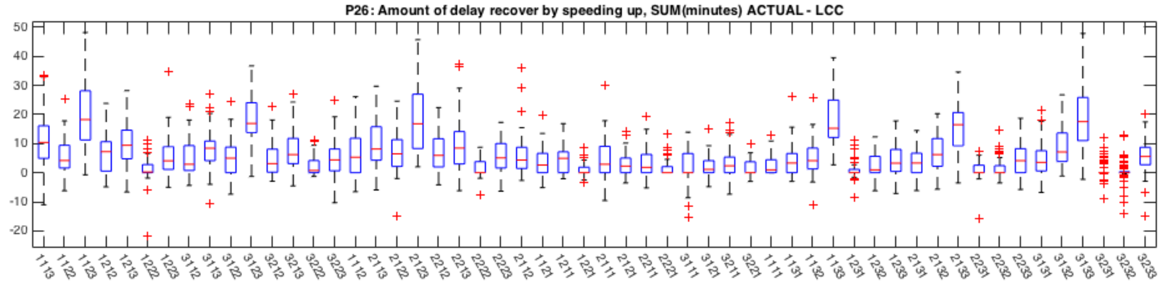

P26: Amount of delay recover by speeding up, SD(minutes) FINAL - LCC

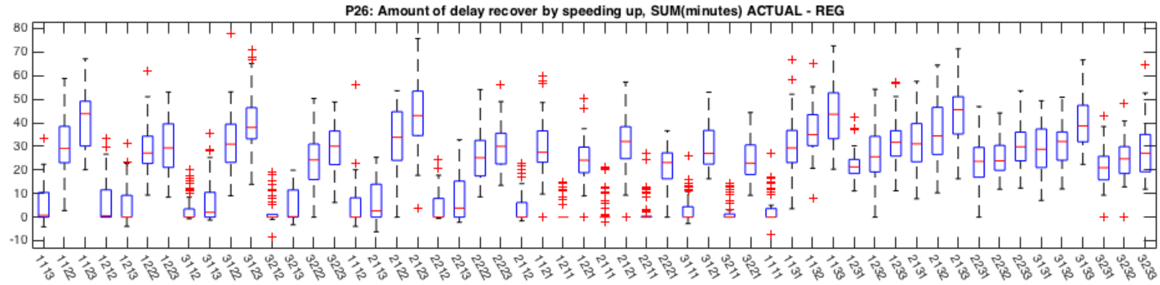

P26: Amount of delay recover by speeding up, SD(minutes) FINAL - REG

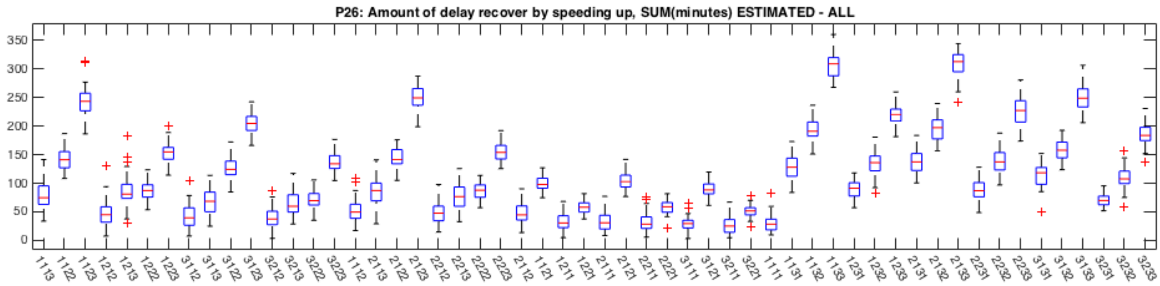

P26: Amount of delay recover by speeding up, SUM(minutes) ACTUAL - ALL

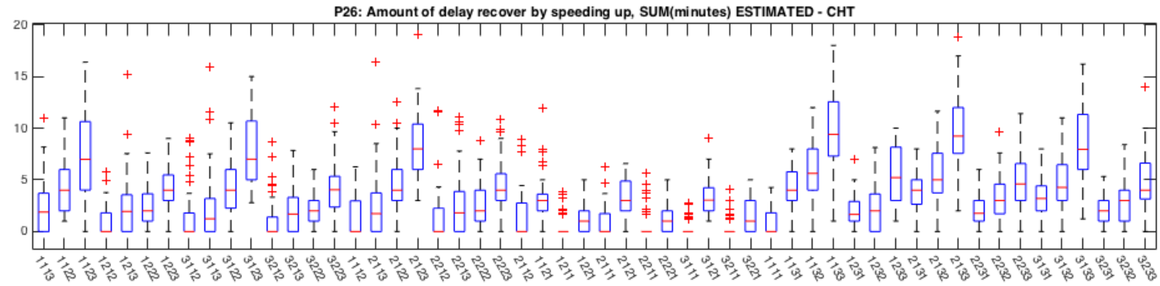

P26: Amount of delay recover by speeding up, SUM(minutes) ACTUAL - CHT

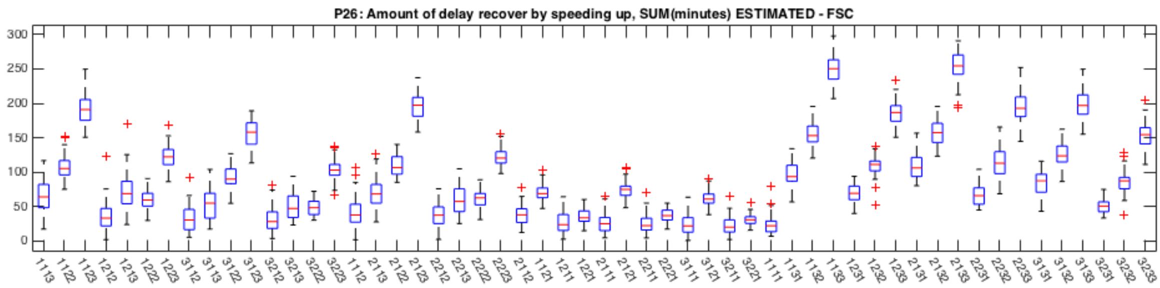

P26: Amount of delay recover by speeding up, SUM(minutes) ACTUAL - FSC


P26: Amount of delay recover by speeding up, SUM(minutes) ACTUAL - LCC

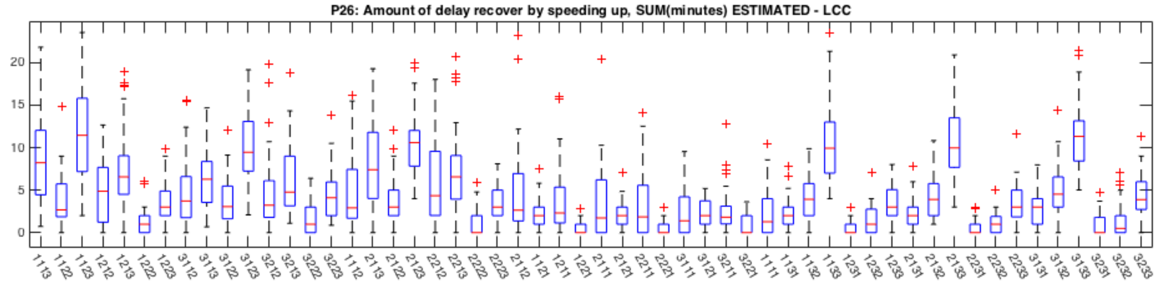

P26: Amount of delay recover by speeding up, SUM(minutes) ACTUAL - REG


P26: Amount of delay recover by speeding up, SUM(minutes) ESTIMATED - ALL

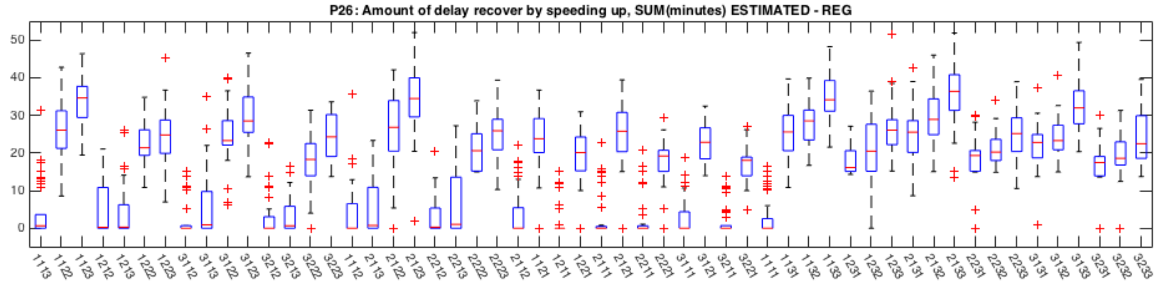

P26: Amount of delay recover by speeding up, SUM(minutes) ESTIMATED - CHT


P26: Amount of delay recover by speeding up, SUM(minutes) ESTIMATED - FSC

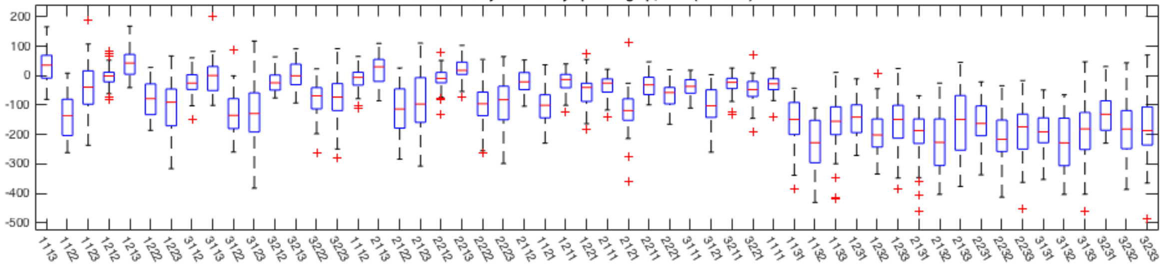
P26: Amount of delay recover by speeding up, SUM(minutes) ESTIMATED - LCC



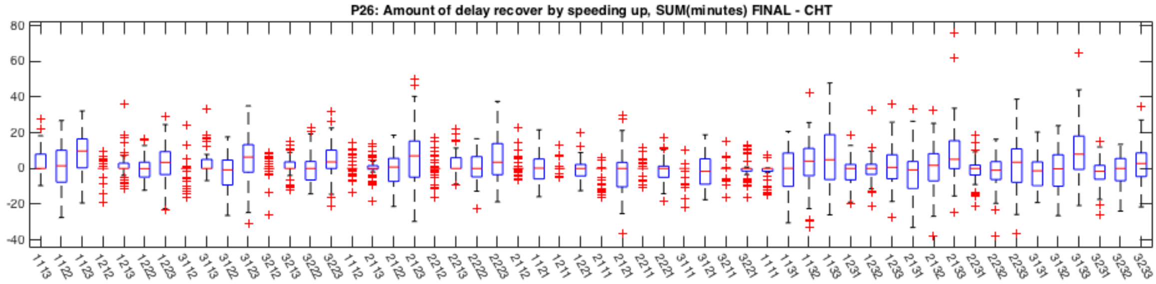
P26: Amount of delay recover by speeding up, SUM(minutes) ESTIMATED - REG



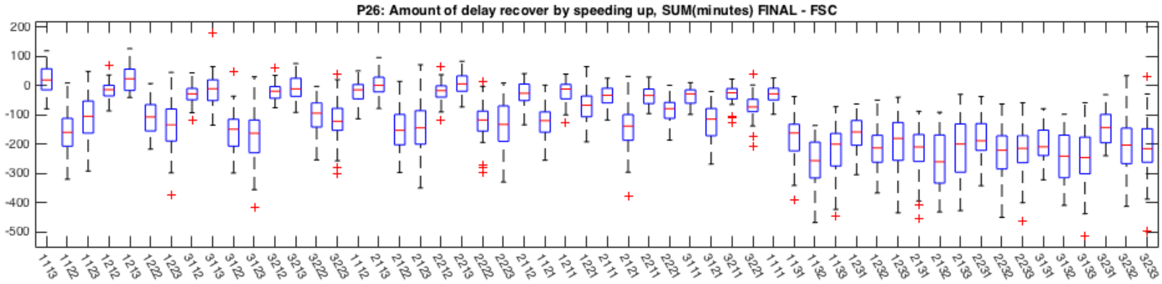
P26: Amount of delay recover by speeding up, SUM(minutes) FINAL - ALL

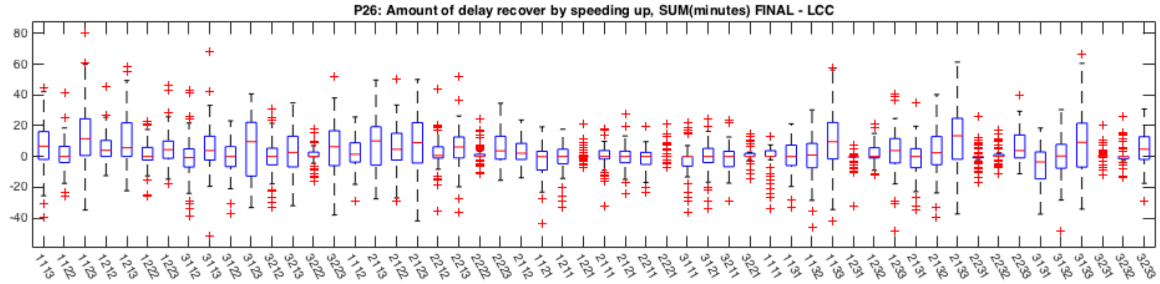


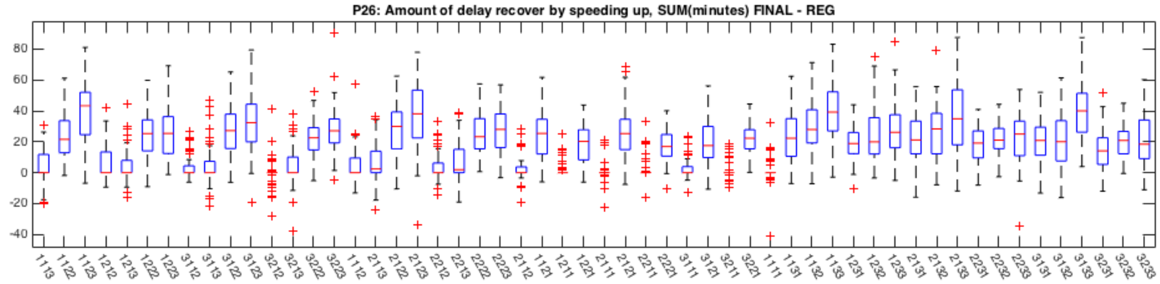
P26: Amount of delay recover by speeding up, SUM(minutes) FINAL - CHT

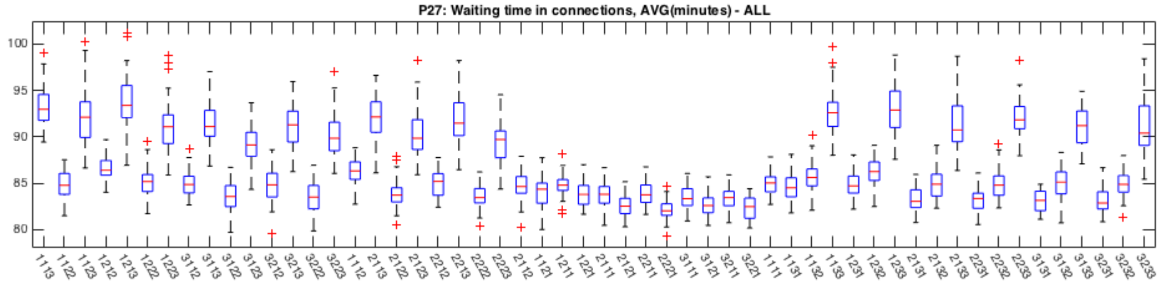


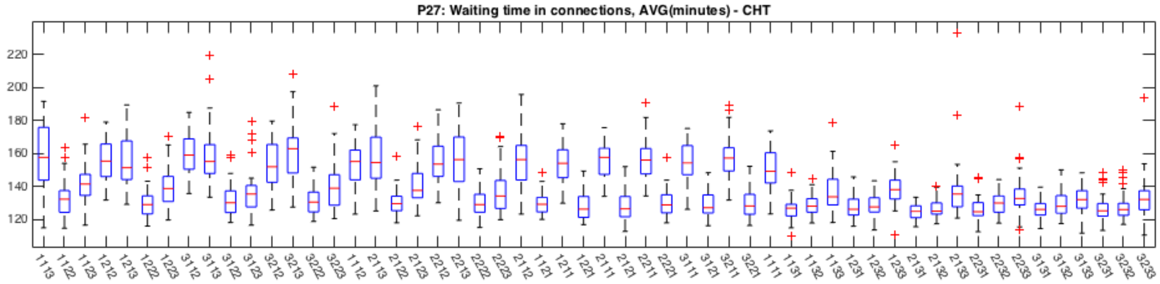
P26: Amount of delay recover by speeding up, SUM(minutes) FINAL - FSC

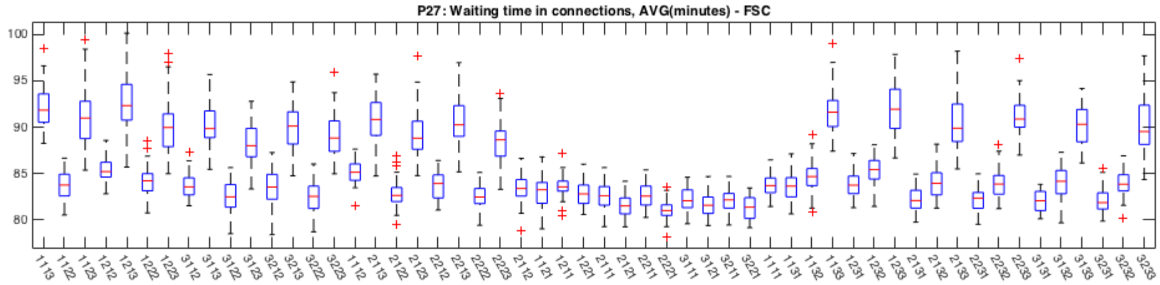



P26: Amount of delay recover by speeding up, SUM(minutes) FINAL - LCC

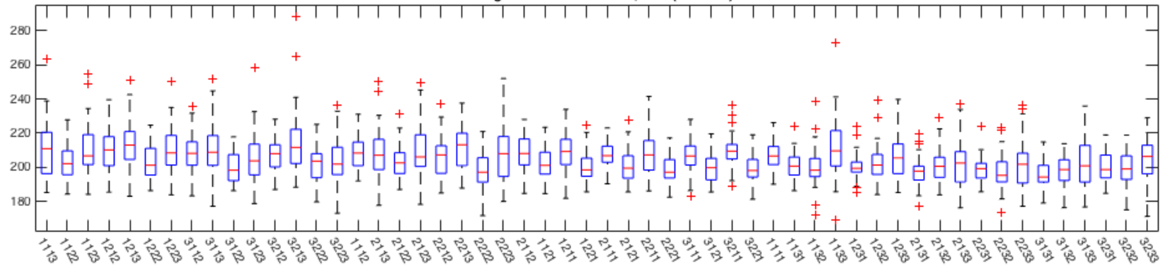

P26: Amount of delay recover by speeding up, SUM(minutes) FINAL - REG


P27: Waiting time in connections, AVG(minutes) - ALL

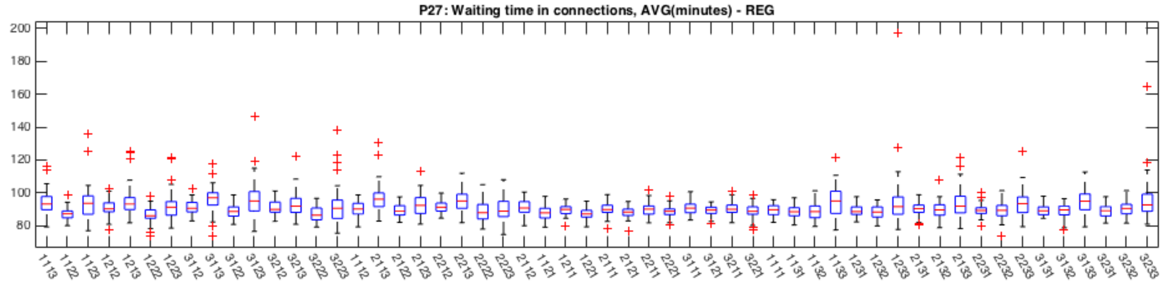

P27: Waiting time in connections, AVG(minutes) - CHT


P27: Waiting time in connections, AVG(minutes) - FSC

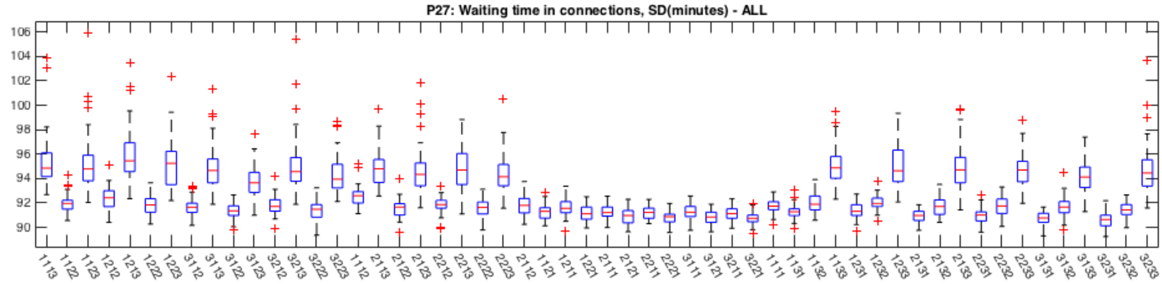
P27: Waiting time in connections, AVG(minutes) - LCC



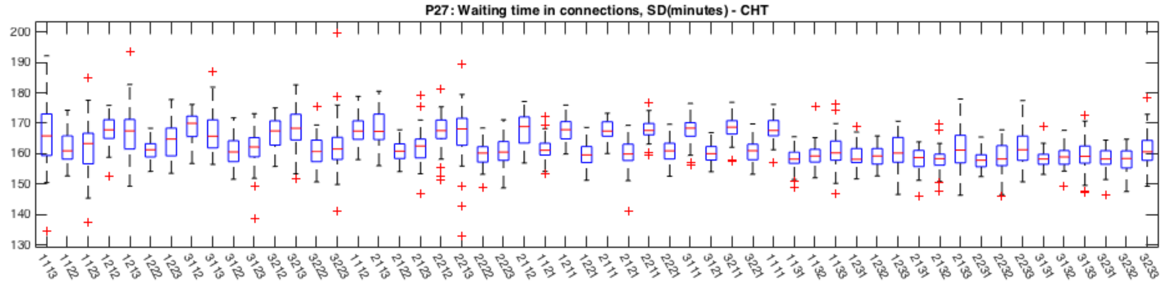
P27: Waiting time in connections, AVG(minutes) - REG



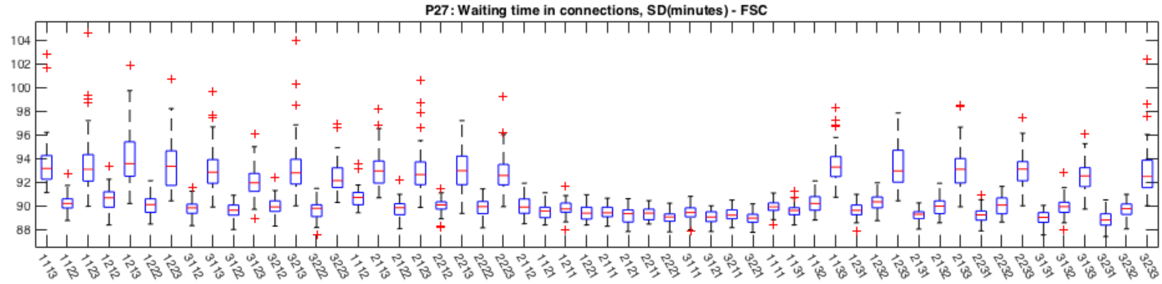
P27: Waiting time in connections, SD(minutes) - ALL

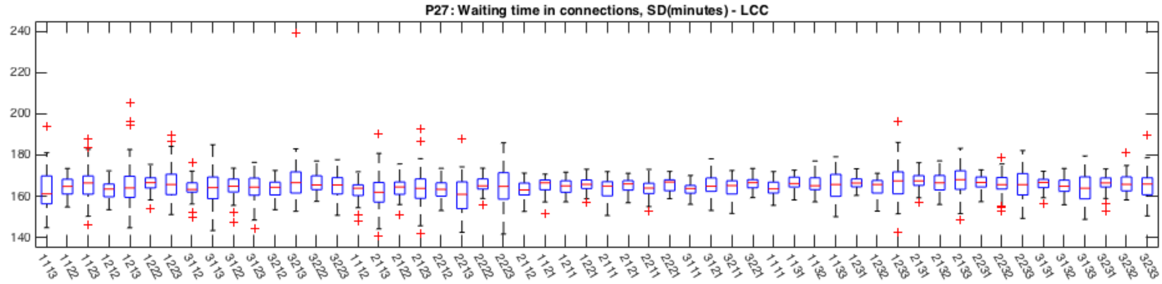


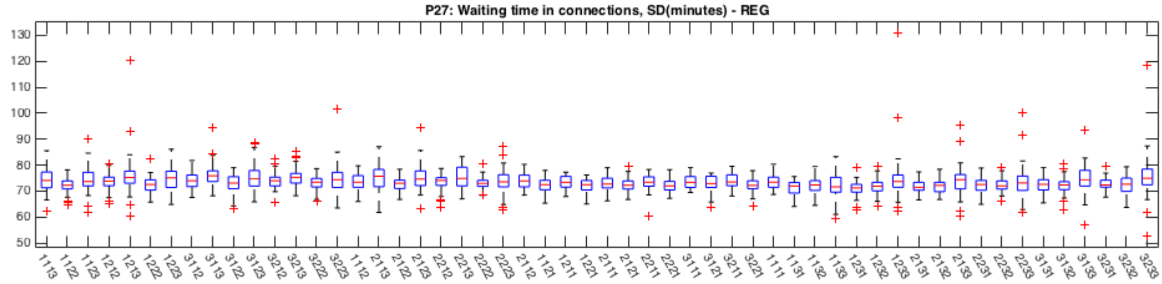
P27: Waiting time in connections, SD(minutes) - CHT

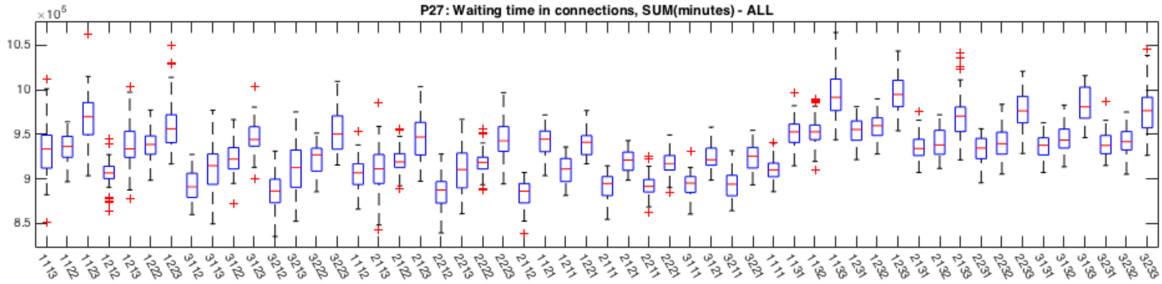


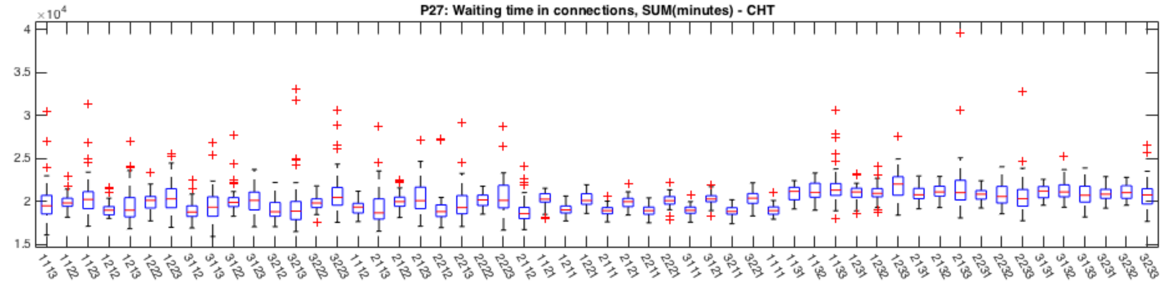
P27: Waiting time in connections, SD(minutes) - FSC

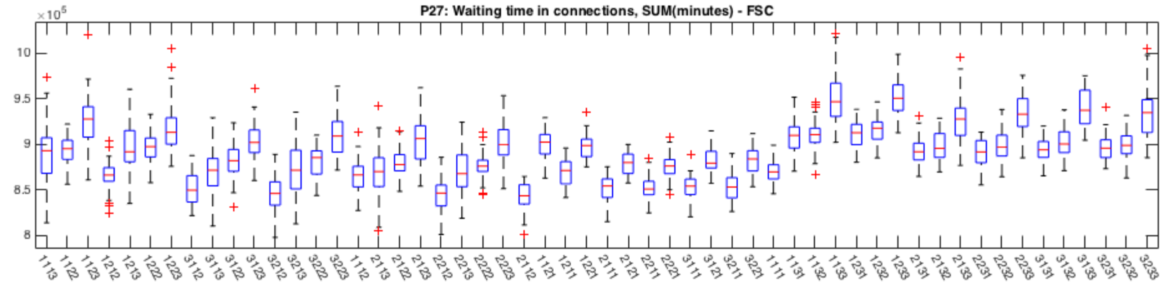


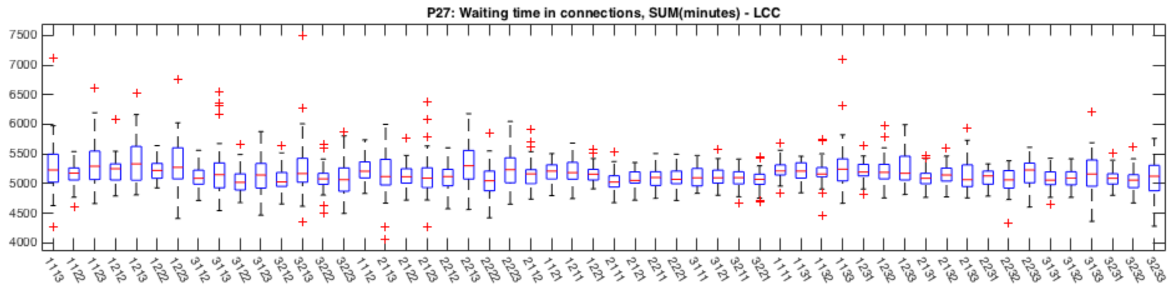

P27: Waiting time in connections, SD(minutes) - LCC

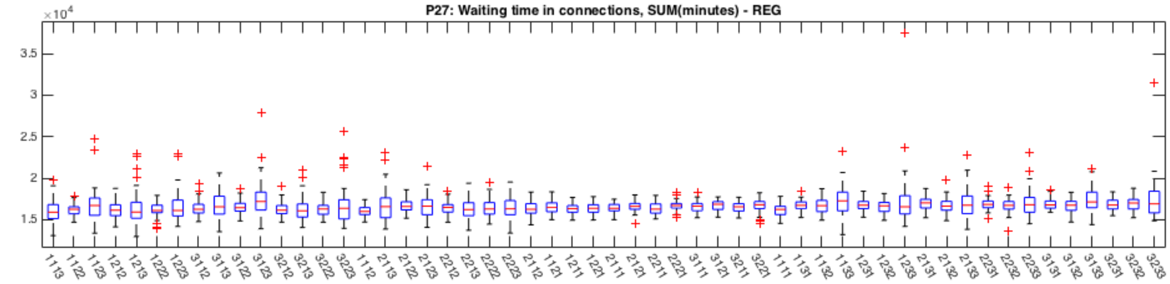

P27: Waiting time in connections, SD(minutes) - REG


P27: Waiting time in connections, SUM(minutes) - ALL


P27: Waiting time in connections, SUM(minutes) - CHT


P27: Waiting time in connections, SUM(minutes) - FSC


P27: Waiting time in connections, SUM(minutes) - LCC


P27: Waiting time in connections, SUM(minutes) - REG